

# **American National Standard**

# **Guide to Human-Factors Taxonomy**

Sponsor

**American Institute of Aeronautics and Astronautics**

Approved

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## **Abstract**

This Guide provides a human-factors taxonomy for the purpose of scientific research and system evaluation. This taxonomy is intended to assist scientists and systems specialists in identifying human factors that affect human performance. The list is derived from aerospace, industry, and military experience and is presented in tabular form.

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## Foreword

The project to develop a human-factors taxonomy was initiated under the auspices of Life Sciences and Systems Committee on Standards (LS&S/COS) of the American Institute of Aeronautics and Astronautics (AIAA) and was an outgrowth of a Military Operations Research Society (MORS) effort to develop a methodology for identifying human factors in mission analysis and modeling. This standard was prepared by members of a MORS working group and expanded by members of the Human Factors and Ergonomics Society. The Working Group also served as the consensus body for approval of the standard for AIAA. The Working Group intends that the document will also respond to the needs of military and homeland security for procurement standards that have a broad base of acceptance in the life sciences community.

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The committee extends its great appreciation to the word processing, illustration, and technical writing staff who made this taxonomy survive its many evolutions.



## 1 Scope

This taxonomy provides a structure for identifying human factors for the purpose of scientific research and system test and evaluation. It should be applied during the planning, conduct, and analysis of human factors. The objectives of this taxonomy are to: (1) identify an extensive list of human factors, (2) promote commonality in nomenclature and units of measurement, and (3) enable the development and use of common human-factors taxonomy for data collection and data processing.

## 2 Purpose

The purpose of this standard is to guide the reader in identifying human factors. The information contained in this document is provided as guidance, with the intention that it will be tailored for the specific use. This standard may also be used for task analysis. The purpose of analyzing performance of selected tasks, subtasks, and task elements contained in the task inventory by addressing the lowest taxonomic level specified by the procuring activity is to describe task performance in terms of human performance time and accuracy. The product of the analytic effort is intended for use in support of equipment design, testing and evaluation, training requirements identification, manning and workload assessment, development of training and maintenance manuals, and other documentation and reporting.

A set of data relevant to each task should be collected and analyzed. For each of these tasks, the minimum data collected and analyzed should be equipment acted upon, consequence of the action, and feedback information resulting from the action. Analysis results should identify at least the following:

- (1) Task performance standards,
- (2) An estimate of probability of error as a function of aptitude and training,
- (3) An estimate of the time to successful performance as a function of aptitude and training, and
- (4) A time-and-error rate associated with each critical task and how it relates to the time-and error rate and performance time for the overall system.

## 3 Applications

These guidelines are appropriate for a variety of behavioral specialties, technologies, and applications.

The behavioral specialties include:

- (1) Human-factors engineering, in which measurements are made to determine whether the physical configuration of an equipment or system is adequate for human control and operation;
- (2) Training, in which measurements are made to determine the effects of instruction on personnel performance or to determine the instructional variables affecting performance; and
- (3) Test and evaluation, in which measurements are made of personnel performing with equipments and systems to determine the proficiency of personnel and whether their performance is adequate to the requirements.

## 4 Vocabulary

### **artificial environment**

The characteristics of the environment affected by humans.

### **asymptotic learning**

the point at which performance does not improve with increased practice

### **complexity**

the number and amount of interdependencies among system

**consensus**

Substantial agreement has been reached by directly and materially affected interests.

**continuous performance**

performance, such as tracking or monitoring, that requires constant attention over a period of time

**defensive posture**

state of readiness to defend the system

**dimensions**

units of measurement, e.g., deviation from glide slope in meters

**discrete performance**

performance that has a well-defined start and end, such as switch activation or issuance of a voice command

**discrimination**

separation of the noise and noise-plus-signal distributions

**duty**

a set of operationally-related tasks within a given job, e.g., driving, weapon servicing, communicating, target detection, self protection, and operator maintenance (Mil-Std-46855)

**element**

the smallest logically definable unit of behavior required for completing a task or step, e.g., verify that rpm is between 4500 and 6000 (Berson and Crooks, 1976).

**function**

a major category of activity associated with a system or subsystem and assigned to a person or a machine or shared between a person and a machine (Berson and Crooks, 1976).

**HPM**

human performance measurement.

**human factors**

a body of scientific facts about human characteristics. The term covers all biomedical and psychosocial considerations; it includes, but is not limited to, principles and applications in the areas of human engineering, personnel selection, training, life support, job performance aids, and human performance evaluation (Mil-Std-46855)

**human performance**

a measure of human functions and actions in a specified environment (Mil-Std-46855)

**job**

the combination of all human performance required for operation and maintenance of one personnel position in a system, e.g., driver (Mil-Std-46855)

**LED**

light-emitting diode

**mission**

what the system is supposed to accomplish, e.g., combat reconnaissance (Mil-Std-46855).

**mission segment**

a piece of the mission, e.g., takeoff, landing, and en route

**MOPP**

mission oriented protection procedure

**natural environment**

weather and terrain unaffected by humans

**OJT**

on-the-job training

**operational environment**

the characteristics related to the condition of conflict

**payoff matrix**

the value of a hit and a correct rejection; the cost of a miss and a false alarm

**PSF**

performance-shaping factor

**scenario/condition**

Categories of factors or constraints under which the system will be expected to operate and be maintained, e.g., day/night, all weather, all terrain operation (Mil-StdTD-46855).

**step**

the activities (perceptions, decisions, and responses) that fulfill a portion of the immediate purpose within a task; alternatively called a subtask (Berson and Crooks, 1976)

**sub-function**

a breakout of a function. A sub-function may later be allocated to human performance, in which case it becomes a “task”. If hardware or software will perform it, it stays a sub-function

**subtask**

activities (perceptions, decisions, and responses) which fulfill a portion of the immediate purpose within a task, e.g., remove lug nuts (Mil-Std-46855)

**support**

provision of required items

**task**

composite of related activities (perceptions, decisions, and responses) performed for an immediate purpose, e.g., takeoff from an airfield (Berson and Crooks, 1976)

**task element**

the smallest logically and reasonably definable unit of behavior required in completing a task or subtask, e.g., apply counterclockwise torque to the lug nuts with a lug wrench (Mil-Std-46855)

**workload**

the relative capacity to respond (Lysaght, Hill, Dick, Plamondon, Linton, Wierwille, Zaklad, Bittner, and Wherry, 1989, p. 27)

## 5 Human-Factors Taxonomy

Two criteria were used to develop the task portion of the taxonomy. It must describe:

- (1) The dimensions of the task and its environment and
- (2) What the task is, rather than how the operator performs the task (Berry, 1980).

Nine additional criteria (Companion and Corso, 1977, pp. 359-360) were used during the development of the complete taxonomy. A taxonomy:

- (1) Must simplify the description of tasks in the system,
- (2) Should be generalizable,
- (3) Must be compatible with the terms used by others,
- (4) Must be complete and internally consistent,
- (5) Must be compatible with the theory or system to which it will be applied,
- (6) Should help to predict operator performance,
- (7) Must have some utility,
- (8) Must be cost effective, and
- (9) Must provide a framework around which all relevant data can be integrated.

Finally, four rules were applied in developing the structure of the taxonomy:

- (1) No more than nine sublevels were allowed per level except the lowest sublevel that could have more,
- (2) The structure should require a minimum of effort to translate into an executable form such as SAINT or a Petrinet,
- (3) The structure should be closely tied to existing documented taxonomies, e.g., military standards and design handbooks, and
- (4) Must be focused on human factors and not other areas such as provided by <http://www.taxonomywarehouse.com/>.

The taxonomy is presented in text form in Table 1. In the table, many of the names are followed by clarifications in parentheses, units of measurement in brackets, or both. Portions of the taxonomy were derived from Chignell (1990), Christman (1977), Edmondson (1993), Fleishman (1975), Gawron, Drury, Czaja, and Wilkins (1989), Joint Chiefs of Staff Publications 1-02 and 3-0, Sasou and Reason (1999), Stanney, Hash, and Dryer (1995), and TRADOC PAM 11-9.

Items 2, Mission, through 2.1.1.1.1.1.1, Task Element, match the taxonomy developed for analysis of tasks as presented in Mil-Std-46855. To maintain complete consistency with this military standard, item 2.1, Scenario/Conditions, is listed as a subcategory of Mission but references item 1, Environment.

**Table 1 Human-Factors Taxonomy**

## 1 Environment

## 1.1 Natural Environment

## 1.1.1 Location

1.1.1.1 Longitude [degrees]

1.1.1.2 Latitude [degrees]

1.1.1.3 Altitude/Depth [meters mean sea level]

## 1.1.2 Space Environment

## 1.1.3 Meteorological Environment

## 1.1.3.1 Air Temperature

1.1.3.1.1 Temperature Range [degrees Celsius]

1.1.3.1.2 Temperature Variability [degrees Celsius]

1.1.3.1.3 Temperature Duration [seconds]

## 1.1.3.2 Pressure

1.1.3.2.1 Atmospheric Pressure [kilopascals]

1.1.3.2.2 Oxygen Partial Pressure [kilopascals]

1.1.3.2.3 Vapor Pressure of Air saturated Water [kilopascals]

## 1.1.3.3 Wind

1.1.3.3.1 Wind Direction [degrees]

1.1.3.3.2 Wind speed [kilometers per hour]

## 1.1.3.4 Relative Humidity [percent]

## 1.1.3.5 Clouds

1.1.3.5.1 Type (cirrus, cumulus, etc.)

1.1.3.5.2 Base [meters]

1.1.3.5.3 Ceiling [meters]

1.1.3.5.4 Coverage [percent]

## 1.1.3.6 Precipitation

1.1.3.6.1 Type (visible moisture)

1.1.3.6.1.1 Hail [centimeters]

1.1.3.6.1.2 Rain [millimeters]

1.1.3.6.1.3 Sleet [centimeters]

1.1.3.6.1.4 Snow [centimeters]

- 1.1.3.6.1.5 Ice [centimeters]
- 1.1.3.6.2 Rate [millimeters per hour]
- 1.1.3.6.3 Duration [hours]
- 1.1.3.6.4 Equivalent Depth [millimeters of water]
- 1.1.3.7 Electrical Disturbances
  - 1.1.3.7.1 Lightning
    - 1.1.3.7.1.1 Rate [strikes per hour]
    - 1.1.3.7.1.2 Duration [hours]
  - 1.1.3.7.2 Solar Storms
    - 1.1.3.7.2.1 Rate [flares per hour]
    - 1.1.3.7.2.2 Duration [hours]
- 1.1.3.8 Visibility
  - 1.1.3.8.1 Obscurants
    - 1.1.3.8.1.1 Smoke [parts per million]
    - 1.1.3.8.1.2 Dust [parts per million]
    - 1.1.3.8.1.3 Fog [parts per million]
    - 1.1.3.8.1.4 Haze or Smog [parts per million]
  - 1.1.3.8.2 Horizontal Visibility [kilometers]
  - 1.1.3.8.3 Ambient Illumination
    - 1.1.3.8.3.1 Twilight Beginning/Ending [time of day]
    - 1.1.3.8.3.2 Moon Phase/Rise/Set [time of day]
    - 1.1.3.8.3.3 Star Brilliance [lux]
    - 1.1.3.8.3.4 Sun Intensity/Rise/Set [lux and time of day]
  - 1.1.3.8.4 Sun/Moon Angle [degrees azimuth and elevation]
- 1.1.4 Terrestrial Environment
  - 1.1.4.1 Topography
    - 1.1.4.1.1 Minor Relief Features
      - 1.1.4.1.1.1 High Ground (mesas, buttes, ridges, dunes)
      - 1.1.4.1.1.2 Depressions (basins, canyons, wadis)
      - 1.1.4.1.1.3 Breaks in High Ground (passes, gaps)
      - 1.1.4.1.1.4 Special Features of Terrain (talus slopes, boulder fields)
    - 1.1.4.1.2 Micro-relief Features of Terrain (low escarpments, stream banks, pits, dikes, swales, kames, moraines)

1.1.4.1.3 Elevation or Slope of Terrain

1.1.4.1.3.1 Shape of Terrain (convex, concave, uniform)

1.1.4.1.3.2 Angle of Terrain (percent, degrees, gradient)

1.1.4.2 Surface Composition

1.1.4.2.1 Soil

1.1.4.2.1.1 Composition (clay, gravel, loam, sand, silt)

1.1.4.2.1.2 Bedrock Depth [meters]

1.1.4.2.1.3 Moisture in Soil

1.1.4.2.1.4 Layering of Soil

1.1.4.2.2 Rock

1.1.4.2.2.1 Formation Class (igneous, sedimentary, metamorphic)

1.1.4.2.2.2 Thickness of Rock [meters]

1.1.4.2.2.3 Consistency [loose, solid]

1.1.4.3 Drainage of Terrain

1.1.4.3.1 Watersheds, Water Courses, and Water Bodies (stream, river, creek, canal, lake)

1.1.4.3.1.1 Flow Velocity, Tidal Effects, Flooding Potential

1.1.4.3.1.2 Water Crossings

1.1.4.3.1.3 Banks/Shore (composition, height, condition)

1.1.4.3.1.4 Terrain Adjacent to Water

1.1.4.3.1.5 Dimensions of Water Body (width, depth) [meters]

1.1.4.3.2 Wet Areas (swamp, marsh, bog, paddy)

1.1.4.3.2.1 Inundation Causes

1.1.4.3.2.2 Crossing of wet Areas

1.1.4.3.2.3 Flooding Potential of Wet Areas

1.1.4.4 Flora (naturally occurring)

1.1.4.4.1 Trees

1.1.4.4.1.1 Canopy Height [meters]

1.1.4.4.1.2 Coverage [percent]

1.1.4.4.1.3 Density

1.1.4.4.1.4 Trunk Diameter [centimeters]

1.1.4.4.2 Shrubs

1.1.4.4.3 Grasses and Crops

#### 1.1.4.4.4 Micro-organisms

##### 1.1.4.4.4.1 Biological Agents

###### 1.1.4.4.4.1.1 Bacterial Agents

1.1.4.4.4.1.1.1 *Bacillus anthracis*

1.1.4.4.4.1.1.2 *Brucella*

1.1.4.4.4.1.1.2.1 *Brucella abortus*

1.1.4.4.4.1.1.2.2 *Brucella canis*

1.1.4.4.4.1.1.2.3 *Brucella melitensis*

1.1.4.4.4.1.1.2.4 *Brucella neotomae*

1.1.4.4.4.1.1.2.5 *Brucella ovis*

1.1.4.4.4.1.1.2.6 *Brucella subspecies*

1.1.4.4.4.1.1.2.7 *Brucella suis*

1.1.4.4.4.1.1.3 *Bacillus cereus*

1.1.4.4.4.1.1.4 *Bacillus stearothermophilus*

1.1.4.4.4.1.1.5 *Francisella tularensis*

1.1.4.4.4.1.1.6 *Malleomyces mallei*

1.1.4.4.4.1.1.7 *Malleomyces pseudomallei*

1.1.4.4.4.1.1.8 *Mycobacterium tuberculosis*

1.1.4.4.4.1.1.9 *Pasteurella pestis*

1.1.4.4.4.1.1.10 *Pasteurella tularensis*

1.1.4.4.4.1.1.11 *Salmonella* (nonspecific)

1.1.4.4.4.1.1.12 *Salmonella typhimurium*

1.1.4.4.4.1.1.13 *Serratia marcescens*

1.1.4.4.4.1.1.14 Spores (nonspecific, produced by bacteria)

1.1.4.4.4.1.1.15 *Vibrio cholerae*

1.1.4.4.4.1.1.16 *Yersinia pestis*

###### 1.1.4.4.4.1.2 Fungi

1.1.4.4.4.1.2.1 *Coccidioides immitis*

1.1.4.4.4.1.2.2 Herbicidal Fungi

1.1.4.4.4.1.2.2.1 *Phytophthora infestans*

1.1.4.4.4.1.2.2.2 *Sclerotium rolfsi*

1.1.4.4.4.1.2.3 *Histoplasma capsulatum*

1.1.4.4.4.1.3 Rickettsia

- 1.1.4.4.4.1.3.1 *Coxiella burnetii*
- 1.1.4.4.4.1.3.2 *Rickettsia australis*
- 1.1.4.4.4.1.3.3 *Rickettsia conori*
- 1.1.4.4.4.1.3.4 *Rickettsia typhi (mooseri)*
- 1.1.4.4.4.1.3.5 *Rickettsia prowazekii*
- 1.1.4.4.4.1.3.6 *Rickettsia rickettsii*
- 1.1.4.4.4.1.3.7 *Rickettsia sibirica*
- 1.1.4.4.4.1.3.8 *Rickettsia tsutsugamushi*

1.1.4.4.4.1.4 Toxins

- 1.1.4.4.4.1.4.1 Aflatoxin G2
- 1.1.4.4.4.1.4.2 Batrachotoxin
- 1.1.4.4.4.1.4.3 Black Widow Spider Venom
- 1.1.4.4.4.1.4.4 Clostridium botulinum Toxins
  - 1.1.4.4.4.1.4.4.1 Clostridium botulinum Neurotoxin A
  - 1.1.4.4.4.1.4.4.2 Clostridium botulinum Neurotoxin B2
  - 1.1.4.4.4.1.4.4.3 Clostridium botulinum Neurotoxin C1
  - 1.1.4.4.4.1.4.4.4 Clostridium botulinum Neurotoxin C2
  - 1.1.4.4.4.1.4.4.5 Clostridium botulinum Neurotoxin D
  - 1.1.4.4.4.1.4.4.6 Clostridium botulinum Neurotoxin E
  - 1.1.4.4.4.1.4.4.7 Clostridium botulinum Neurotoxin F
  - 1.1.4.4.4.1.4.4.8 Clostridium botulinum Neurotoxin G
- 1.1.4.4.4.1.4.5 Cobra Venom
- 1.1.4.4.4.1.4.6 Endotoxins
- 1.1.4.4.4.1.4.7 Fusarium trichothecenes
- 1.1.4.4.4.1.4.8 Hornet Venom
- 1.1.4.4.4.1.4.9 Microcystin
- 1.1.4.4.4.1.4.10 Picrotoxin
- 1.1.4.4.4.1.4.11 Rattlesnake Venom
- 1.1.4.4.4.1.4.12 Ricin
- 1.1.4.4.4.1.4.13 Saxitoxin
- 1.1.4.4.4.1.4.14 Scorpion Venom

- 1.1.4.4.4.1.4.15 Snake (nonspecific) Venom
- 1.1.4.4.4.1.4.16 Staphylococcal Enterotoxins
  - 1.1.4.4.4.1.4.16.1 Staphylococcal Enterotoxin A
  - 1.1.4.4.4.1.4.16.2 Staphylococcal Enterotoxin B
- 1.1.4.4.4.1.4.17 Tetrodotoxin
- 1.1.4.4.4.1.4.18 Trichothecenes
- 1.1.4.4.4.1.4.19 Vibrio Cholerae Enterotoxin
- 1.1.4.4.4.1.4.20 Wasp Venom
- 1.1.4.4.4.1.4.21 Yellow Rain
- 1.1.4.4.4.1.5 Viruses
  - 1.1.4.4.4.1.5.1 Chlamydia psittaci Virus
  - 1.1.4.4.4.1.5.2 Dengue Fever Virus
  - 1.1.4.4.4.1.5.3 Encephalitis Viruses
    - 1.1.4.4.4.1.5.3.1 Encephalitis Lethargica Virus
    - 1.1.4.4.4.1.5.3.2 Japanese Encephalitis Virus
    - 1.1.4.4.4.1.5.3.3 Russian Spring-Summer Encephalitis Virus
    - 1.1.4.4.4.1.5.3.4 Venezuelan Equine Encephalitis Virus
    - 1.1.4.4.4.1.5.3.5 Western Encephalitis Virus
  - 1.1.4.4.4.1.5.4 Encephalomyelitis Viruses
    - 1.1.4.4.4.1.5.4.1 Venezuelan Equine Encephalomyelitis Virus
  - 1.1.4.4.4.1.5.5 Hemmoragic Fever Virus
    - 1.1.4.4.4.1.5.5.1 Ebola Fever Virus
    - 1.1.4.4.4.1.5.5.2 Lassa Fever Virus
    - 1.1.4.4.4.1.5.5.3 Marburg Fever Virus
  - 1.1.4.4.4.1.5.6 Influenza Virus
  - 1.1.4.4.4.1.5.7 Meningitis Virus
  - 1.1.4.4.4.1.5.8 Newcastle Disease (Avian Pneumoencephalitis) Virus
  - 1.1.4.4.4.1.5.9 Onyong-Nyong Virus
  - 1.1.4.4.4.1.5.10 Psittacosis Virus
  - 1.1.4.4.4.1.5.11 Rift Valley Fever Virus
  - 1.1.4.4.4.1.5.12 Smallpox Virus
  - 1.1.4.4.4.1.5.13 Vesicular Stomatitis Virus

1.1.4.4.4.1.5.14 Yellow Fever Virus

1.1.4.4.4.1.6 Yeasts

1.1.4.4.5 Hostile Flora

1.1.4.4.5.1 Poisonous Flora

1.1.4.4.5.1.1 Poison Ivy

1.1.4.4.5.1.2 Poison Oak

1.1.4.4.5.1.3 Poison Sumac

1.1.4.4.5.2 Thorns

1.1.4.5 Fauna (naturally occurring)

1.1.4.5.1 Insects

1.1.4.5.1.1 Ticks

1.1.4.5.1.2 Fleas

1.1.4.5.1.3 Mosquitoes

1.1.4.5.1.4 Mites

1.1.4.5.1.5 Arachnids

1.1.4.5.1.6 Parasites

1.1.4.5.2 Carnivores

1.1.4.5.3 Harmless Fauna

1.1.4.6 Oceanographic Environment

1.1.4.6.1 Temperature

1.1.4.6.1.1 Temperature Range [degrees Celsius]

1.1.4.6.1.2 Temperature Variability [degrees Celsius]

1.1.4.6.2 Pressure [kilopascals]

1.1.4.6.3 Current

1.1.4.6.3.1 Velocity [meters per second]

1.1.4.6.3.2 Direction [degrees]

1.1.4.6.4 Thermocline depth [meters]

1.1.4.6.5 Topography

1.1.4.6.6 Acoustic Disturbances

1.1.4.6.6.1 Wave Action

1.1.4.6.6.2 Whales

1.1.4.7 Artificial Environment

1.1.5 Nuclear Environment (initial and residual)

1.1.5.1 Blast Overpressure

1.1.5.1.1 Dynamic Pressure [kilopascals]

1.1.5.1.2 Static Pressure [kilopascals]

1.1.5.2 Radiation Exposure

1.1.5.2.1 Ionizing Radiation [sieverts for dose equivalent]

1.1.5.2.1.1 Gamma Radiation [grays for absorbed dose]

1.1.5.2.1.2 Neutron Radiation

1.1.5.2.1.3 Beta Radiation

1.1.5.2.1.4 X-Radiation [grays per minute for absorbed dose]

1.1.5.2.2 Non-ionizing Radiation Exposure

1.1.5.2.2.1 Infrared Radiation [joules per square meter]

1.1.5.2.2.2 Visible Radiation [joules per square meter]

1.1.5.2.2.3 Ultraviolet Radiation [joules per square meter]

1.1.5.2.2.4 Radio-Frequency (RF) Radiation [microwatts per square centimeter]

1.1.5.2.3 Radiation Shielding

1.1.5.2.3.1 Gun Shielding

1.1.5.2.3.2 Frequency Domain Coding Shielding

1.1.5.2.3.3 Tank Shielding

1.1.5.2.3.4 Vehicle Shielding

1.1.5.3 Isotopes in Fallout (long half life)

1.1.5.4 Residual Radiation

1.1.5.4.1 Contaminated Metal

1.1.5.4.2 Contaminated Soil

1.1.5.5 Nuclear-Induced Weather Patterns

1.1.6 Chemical Agents

1.1.6.1 Alogens

1.1.6.1.1 5-Hydroxytryptamine [parts per million]

1.1.6.1.2 Acetylcholine [parts per million]

1.1.6.1.3 Histamine [parts per million]

1.1.6.2 Binary Agents

1.1.6.2.1 EA5774 [parts per million]

1.1.6.2.2 EA5823 [parts per million]

1.1.6.2.3 EA5824 [parts per million]

1.1.6.2.4 EA5825 [parts per million]

1.1.6.2.5 EA5826 [parts per million]

#### 1.1.6.3 Blister Agents

##### 1.1.6.3.1 Blister Agent Arsenicals

1.1.6.3.1.1 Ethyldichloroarsine [parts per million]

1.1.6.3.1.2 Methyldichloroarsine [parts per million]

1.1.6.3.1.3 Phenyl dichloroarsine [parts per million]

##### 1.1.6.3.2 H Agents

1.1.6.3.2.1 H [parts per million]

1.1.6.3.2.2 HD [parts per million]

1.1.6.3.2.3 HL [parts per million]

1.1.6.3.2.4 HN-1 [parts per million]

1.1.6.3.2.5 HN-2 [parts per million]

1.1.6.3.2.6 HN-3 [parts per million]

1.1.6.3.2.7 HS [parts per million]

1.1.6.3.2.8 HT [parts per million]

1.1.6.3.2.9 THD [parts per million]

1.1.6.3.2.10 THL [parts per million]

##### 1.1.6.3.3 L Agents

1.1.6.3.3.1 L [parts per million]

1.1.6.3.3.2 TL [parts per million]

1.1.6.3.4 Phosgene Oxime [parts per million]

1.1.6.3.5 Sesquimustard [parts per million]

1.1.6.3.6 T [parts per million]

#### 1.1.6.4 Blood Agents

1.1.6.4.1 Arsine [parts per million]

1.1.6.4.2 Cyanogen Chloride [parts per million]

1.1.6.4.3 Hydrogen Cyanide [parts per million]

#### 1.1.6.5 Chemical Agent Precursors

1.1.6.5.1 Amine Experimental Drugs [parts per million]

1.1.6.5.2 Methylphosphonic Dichloride [parts per million]

1.1.6.5.3 Methylphosphonic Difluoride [parts per million]

1.1.6.5.4 Phosphorus Oxychloride [parts per million]

1.1.6.5.5 Picrate Experiments [parts per million]

1.1.6.5.6 Pinacolyl Alcohol [parts per million]

1.1.6.5.7 QL [parts per million]

1.1.6.5.8 Selenide Experiments [parts per million]

1.1.6.5.9 Thiodiglycol [parts per million]

#### 1.1.6.6 Choking Agents

1.1.6.6.1 Chlorine Gas [parts per million]

1.1.6.6.2 Chloropicrin [parts per million]

1.1.6.6.3 Diphosgene [parts per million]

1.1.6.6.4 Phosgene [parts per million]

1.1.6.6.5 Triphosgene [parts per million]

#### 1.1.6.7 Herbicides

1.1.6.7.1 2,4 (Dichlorophenoxy) Acetic Acid [parts per million]

1.1.6.7.2 2,4,5 (Trichlorophenoxy) Acetic Acid [parts per million]

1.1.6.7.3 Agent Blue [parts per million]

1.1.6.7.4 Agent Orange [parts per million]

1.1.6.7.5 Agent Pink [parts per million]

1.1.6.7.6 Agent Purple [parts per million]

1.1.6.7.7 Agent White [parts per million]

1.1.6.7.8 Bromacil [parts per million]

1.1.6.7.9 Dioxin [parts per million]

#### 1.1.6.8 Incapacitating Agents

1.1.6.8.1 3-Quinuclidinyl Benzilate [parts per million]

1.1.6.8.2 Blue-X [parts per million]

#### 1.1.6.9 Nerve Agents

1.1.6.9.1 EA5365 [parts per million]

1.1.6.9.2 Ethyl-p-nitrophenyl Methylphosphonate [parts per million]

1.1.6.9.3 Flash [parts per million]

1.1.6.9.4 G Agents

1.1.6.9.4.1 Dimebu [parts per million]

- 1.1.6.9.4.2 G [parts per million]
- 1.1.6.9.4.3 GA [parts per million]
- 1.1.6.9.4.4 GB [parts per million]
- 1.1.6.9.4.5 GD [parts per million]
- 1.1.6.9.4.6 GE [parts per million]
- 1.1.6.9.4.7 GF [parts per million]
- 1.1.6.9.4.8 TGD [parts per million]

#### 1.1.6.9.5 V Agents

- 1.1.6.9.5.1 TVX [parts per million]
- 1.1.6.9.5.2 V [parts per million]
- 1.1.6.9.5.3 VE [parts per million]
- 1.1.6.9.5.4 VG [parts per million]
- 1.1.6.9.5.5 VM [parts per million]
- 1.1.6.9.5.6 VS [parts per million]
- 1.1.6.9.5.7 VX [parts per million]

#### 1.1.6.10 Other Chemical Agents

- 1.1.6.10.1 Acrylamides [parts per million]
- 1.1.6.10.2 Butyl Salicylate [parts per million]
- 1.1.6.10.3 Cadmium Chloride [parts per million]
- 1.1.6.10.4 Cadmium Fluoride [parts per million]
- 1.1.6.10.5 Chloroethylamine [parts per million]
- 1.1.6.10.6 Chloroethylmethylamine [parts per million]
- 1.1.6.10.7 Diisopropyl Fluorophosphate [parts per million]
- 1.1.6.10.8 Dimethylpolysulfide [parts per million]
- 1.1.6.10.9 Disulfur Decafluoride [parts per million]
- 1.1.6.10.10 Neostigmine [parts per million]
- 1.1.6.10.11 Phencyclidine [parts per million]
- 1.1.6.10.12 Sodium Arsenite [parts per million]

#### 1.1.6.11 Psycho-Toxic Agents

- 1.1.6.11.1 Antidepressants [parts per million]
- 1.1.6.11.2 Antioxilytic Sedative Substances [parts per million]
- 1.1.6.11.3 Neuroleptics [parts per million]

1.1.6.11.4 Psychodisleptics [parts per million]

1.1.6.11.5 Psychostimulators [parts per million]

1.1.6.12 Tear Agents

1.1.6.12.1 2-Bromobenzylcyanide [parts per million]

1.1.6.12.2 Bromoacetone [parts per million]

1.1.6.12.3 Chloroacetophenone [parts per million]

1.1.6.12.4 Chloroacetophenone/Chloroform Mixture [parts per million]

1.1.6.12.5 Chloroform [parts per million]

1.1.6.12.6 CN/Benzene/Carbon Tetrachloride Mixture [parts per million]

1.1.6.12.7 CN/Chloropicrin/Chloroform Mixture [parts per million]

1.1.6.12.8 Ethylbromoacetate [parts per million]

1.1.6.12.9 Orthochlorobenzylidene Malonitrile [parts per million]

1.1.6.13 Vomiting Agents

1.1.6.13.1 Vomiting Agent Arsenicals [parts per million]

1.1.6.13.1.1 Diphenylaminoarsine [parts per million]

1.1.6.13.1.2 Diphenylaminochloroarsine [parts per million]

1.1.6.13.1.3 Diphenylchloroarsine [parts per million]

1.1.6.13.1.4 Diphenylcyanoarsine [parts per million]

1.1.7 Electromagnetic Environment (artificial)

1.1.7.1 Electronic Warfare (Electronic Combat) [watts per square meter]

1.1.7.2 Nuclear Electromagnetic Pulse (EMP) [webers per cubic meter per second]

1.1.7.3 Directed Energy

1.1.7.3.1 Laser Radiation [joules per square meter]

1.1.7.3.2 Spotlight

1.1.7.3.3 Neutron and Other Particle Beam Radiation

1.1.7.4 Navigation and Guidance (e. g., missile seeker)

1.1.7.5 Sensor Emission

1.1.7.5.1 Radar Altimeter

1.1.7.5.2 Laser Range Finders

1.1.7.5.3 Radar

1.1.7.6 Station Broadcast

1.1.7.6.1 Radio

1.1.7.6.2 Television

1.1.8 Obscurants

1.1.8.1 Aerosols

1.1.8.2 Chaff [particles per cubic meter]

1.1.8.3 Flares

1.1.8.3.1 Infrared

1.1.8.3.2 Visible Illumination

1.1.8.4 Laser Burnout of Sensors [joules per square meter]

1.1.8.5 Radar Reflectors

1.1.8.6 Smoke (visible and infrared blocking) [parts per million]

1.1.9 Man-Made Features

1.1.9.1 Power Lines

1.1.9.2 Buildings

1.1.9.2.1 Urban Structures

1.1.9.2.2 Rural Structures

1.1.9.2.3 Industrial Facilities (factories, mines)

1.1.9.2.4 Military Fortifications

1.1.9.3 Lines of Communication

1.1.9.3.1 Transportation Routes

1.1.9.3.2 Highways

1.1.9.3.2.1 Blacktop Surface

1.1.9.3.2.2 Dirt Roads

1.1.9.3.3 Railways

1.1.9.3.4 Pipelines

1.1.9.3.5 Structures and Crossings

1.1.9.3.6 Ports, Harbors, and Airfields

1.1.9.4 Anti-Low Level Flight Netting

1.1.9.5 Decoys

1.1.10 Threat Environment

1.1.10.1 Airborne Threats

1.1.10.1.1 Aircraft

1.1.10.1.2 Missiles

1.1.10.1.3 Anti-Aircraft Artillery

1.1.10.1.4 Aerial Mines

1.1.10.1.5 Bombs

1.1.10.2 Ground-Borne Threats

1.1.10.2.1 Tanks

1.1.10.2.2 Artillery

1.1.10.2.3 Land Mines

1.1.10.3 Sea-Borne Threats

1.1.10.3.1 Surface Ships

1.1.10.3.2 Submarines

1.1.10.3.3 Sea Mines

## 1.2 Operational Environment

### 1.2.1 Enemy Situation

1.2.1.1 Disposition of Enemy Forces

1.2.1.1.1 Location (grid, altitude) [degrees, meters above sea level]

1.2.1.1.2 Movement (direction, rate) [degrees, meters per second]

1.2.1.1.3 Density (point, area)

1.2.1.2 Composition of Enemy Forces

1.2.1.2.1 Enemy Task Organization

1.2.1.2.2 Enemy Equipment Types and Characteristics

1.2.1.2.3 Enemy Configuration (mission equipment, loads)

1.2.1.3 Strength of Enemy

1.2.1.3.1 Enemy Unit Strength (committed or reinforcements)

1.2.1.3.1.1 Enemy Personnel (percent of authorized, morale, training)

1.2.1.3.1.2 Enemy Equipment (percent combat ready)

1.2.1.3.2 Enemy Support Status

1.2.1.3.2.1 Enemy Combat Support (air, nuclear, chemical)

1.2.1.3.2.2 Enemy Combat Service Support

1.2.1.4 Significant Activities of Enemy

1.2.1.4.1 Recent Operations of Enemy

1.2.1.4.2 Tempo of Operations of Enemy

1.2.1.5 Vulnerabilities of Enemy

- 1.2.1.5.1 Enemy Protection Levels (ballistic, chemical, electronic)
- 1.2.1.5.2 Enemy Concealment (positioning)
- 1.2.1.5.3 Enemy Security Procedures

## 1.2.2 Friendly Situations

### 1.2.2.1 Disposition of Friendly Forces

- 1.2.2.1.1 Location of Friendly Forces (grid, altitude) [degrees, meters above sea level]
- 1.2.2.1.2 Movement of Friendly Forces (direction, rate) [degrees, meters per second]
- 1.2.2.1.3 Density of Friendly Forces (point, area)

### 1.2.2.2 Composition of Friendly Forces

- 1.2.2.2.1 Task Organization of Friendly Forces
- 1.2.2.2.2 Equipment Types and Characteristics of Friendly Forces
- 1.2.2.2.3 Configuration of Friendly Forces (mission equipment, loads)

### 1.2.2.3 Strength of Friendly Forces

- 1.2.2.3.1 Unit Strength of Friendly Forces (committed, reinforcements)
  - 1.2.2.3.1.1 Personnel of Friendly Forces (percent of authorized, morale, training)
  - 1.2.2.3.1.2 Equipment of Friendly Forces (percent combat ready)
- 1.2.2.3.2 Support Status of Friendly Forces
  - 1.2.3.3.2.1 Combat Support of Friendly Forces (air, nuclear, chemical)
  - 1.2.3.3.2.2 Combat Service Support of Friendly Forces

### 1.2.2.4 Significant Activities of Friendly Forces

- 1.2.2.4.1 Tempo of Operations of Friendly Forces
- 1.2.2.4.2 Civil Affairs of Friendly Forces

### 1.2.2.5 Vulnerabilities of Friendly Forces

- 1.2.2.5.1 Protection Levels of Friendly Forces (ballistic, chemical, electronic)
- 1.2.2.5.2 Concealment of Friendly Forces (positioning)
- 1.2.2.5.3 Security Procedures of Friendly Forces

## 1.2.3 Level of Activity

### 1.2.3.1 War

- 1.2.3.1.1 Strategic War
  - 1.2.3.1.1.1 National War
  - 1.2.3.1.1.2 National Military Situation
  - 1.2.3.1.1.3 Theater War

1.2.3.1.2   Tactical War

    1.2.3.1.2.1   Maneuver Battlefield Operating Systems (BOS)

        1.2.3.1.2.1.1   Move Forces

            1.2.3.1.2.1.1.1   Prepare Forces for Movement

            1.2.3.1.2.1.1.2   Move Force On/Under Surface

            1.2.3.1.2.1.1.3   Move Forces While Mounted

            1.2.3.1.2.1.1.4   Move Forces While Dismounted

            1.2.3.1.2.1.1.5   Move Forces Through Air

            1.2.3.1.2.1.1.6   Close forces Into Tactical Position

        1.2.3.1.2.1.2   Engage Enemy

            1.2.3.1.2.1.2.1   Process Direct Fire Target

            1.2.3.1.2.1.2.2   Select Direct Fire Targets

            1.2.3.1.2.1.2.3   Select Direct Fire System

        1.2.3.1.2.1.3   Control Terrain

            1.2.3.1.2.1.3.1   Control Terrain Through Fire or Fire Potential

            1.2.3.1.2.1.3.2   Occupy Terrain

    1.2.3.1.2.2   Fire Support BOS

        1.2.3.1.2.2.1   Process Ground Targets

            1.2.3.1.2.2.1.1   Select Target to Attack

            1.2.3.1.2.2.1.2   Select Fire Support Attack System

                1.2.3.1.2.2.1.2.1   Determine Attack System Capability

                1.2.3.1.2.2.1.2.2   Determine Attack System Availability

                1.2.3.1.2.2.1.2.3   Select Attack System

            1.2.3.1.2.2.1.3   Develop Order to Fire

        1.2.3.1.2.2.2   Engage Ground Targets

            1.2.3.1.2.2.2.1   Conduct Lethal Engagement

                1.2.3.1.2.2.2.1.1   Conduct Surface Attack

                1.2.3.1.2.2.2.1.2   Adjust/Illuminate Fire Support Targets

                1.2.3.1.2.2.2.1.3   Request Air to Ground Attack

            1.2.3.1.2.2.2.2   Conduct Non-lethal Engagement

                1.2.3.1.2.2.2.2.1   Reduce Enemy Personnel Effectiveness

                    1.2.3.1.2.2.2.2.1.1   Employ Incapacitating Agents

- 1.2.3.1.2.2.2.1.2 Conduct Battlefield Psychological Activities
- 1.2.3.1.2.2.2.2 Reduce Enemy Equipment Effectiveness
  - 1.2.3.1.2.2.2.2.1 Conduct Jamming
  - 1.2.3.1.2.2.2.2.2 Counter Target Acquisition System
  - 1.2.3.1.2.2.2.2.3 Employ Disabling Agents
- 1.2.3.1.2.3 Air Defense BOS
  - 1.2.3.1.2.3.1 Process Air Targets
    - 1.2.3.1.2.3.1.1 Select Air Target to Attack
    - 1.2.3.1.2.3.1.2 Select System for Air Targets
      - 1.2.3.1.2.3.1.2.1 Determine System Capability for Air Engagement
      - 1.2.3.1.2.3.1.2.2 Determine System Availability for Air Engagement
      - 1.2.3.1.2.3.1.2.3 Select System for Air Engagement
    - 1.2.3.1.2.3.1.3 Develop Order to Fire at Air Targets
  - 1.2.3.1.2.3.2 Attack Air Targets
    - 1.2.3.1.2.3.2.1 Conduct Lethal Engagement of Air Targets
      - 1.2.3.1.2.3.2.1.1 Employ Air-to-Air Weapons
      - 1.2.3.1.2.3.2.1.2 Employ Surface-to-Air Weapons
        - 1.2.3.1.2.3.2.1.2.1 Employ Air Defense Artillery
        - 1.2.3.1.2.3.2.1.2.2 Employ Other Unit Fires
    - 1.2.3.1.2.3.2.2 Command and Control BOS
    - 1.2.3.1.2.3.2.3 Acquire and Communicate Information and Maintain Status
    - 1.2.3.1.2.3.2.4 Communicate Information
      - 1.2.3.1.2.3.2.4.1 Receive and Transmit Mission
      - 1.2.3.1.2.3.2.4.2 Receive and Transmit Enemy Information
      - 1.2.3.1.2.3.2.4.3 Receive and Transmit Terrain and Weather Information
    - 1.2.3.1.2.3.2.5 Manage Means of Communicating Information
    - 1.2.3.1.2.3.2.6 Manage Information and Force Status
      - 1.2.3.1.2.3.2.6.1 Store Information
      - 1.2.3.1.2.3.2.6.2 Display Information
      - 1.2.3.1.2.3.2.6.3 Publish and Reproduce Information
      - 1.2.3.1.2.3.2.6.4 Manage Information Distribution
    - 1.2.3.1.2.3.3 Assess Situation

- 1.2.3.1.2.3.3.1 Review Current Situation
  - 1.2.3.1.2.3.3.1.1 Analyze Mission
  - 1.2.3.1.2.3.3.1.2 Fuse Information (information fusion)
  - 1.2.3.1.2.3.3.1.3 Evaluate Incoming Information
- 1.2.3.1.2.3.3.2 Project Future Requirements
- 1.2.3.1.2.3.3.3 Decide on Need for Action or Change
- 1.2.3.1.2.3.4 Determine Actions
  - 1.2.3.1.2.3.4.1 Issue Planning Guidance
  - 1.2.3.1.2.3.4.2 Develop Courses of Action
  - 1.2.3.1.2.3.4.3 Analyze Courses of Action
  - 1.2.3.1.2.3.4.4 Compare Courses of Action
  - 1.2.3.1.2.3.4.5 Select or Modify Courses of Action
- 1.2.3.1.2.3.5 Direct and Lead Subordinate Forces
  - 1.2.3.1.2.3.5.1 Prepare Plans or Orders
    - 1.2.3.1.2.3.5.1.1 Develop and Complete Plans or Orders
    - 1.2.3.1.2.3.5.1.2 Coordinate Support
    - 1.2.3.1.2.3.5.1.3 Approve Orders
  - 1.2.3.1.2.3.5.2 Issue Orders
  - 1.2.3.1.2.3.5.3 Provide Command Presence
- 1.2.3.1.2.4 Intelligence BOS
  - 1.2.3.1.2.4.1 Collect Information
    - 1.2.3.1.2.4.1.1 Collect Information on Situation
      - 1.2.3.1.2.4.1.1.1 Collect Threat Information
      - 1.2.3.1.2.4.1.1.2 Collect Physical Environment Information
      - 1.2.3.1.2.4.1.1.3 Collect Social/Political/Economic Environment Information
    - 1.2.3.1.2.4.1.2 Collect Information on Targets
      - 1.2.3.1.2.4.1.2.1 Search for Targets
      - 1.2.3.1.2.4.1.2.2 Detect Targets
      - 1.2.3.1.2.4.1.2.3 Locate Targets
      - 1.2.3.1.2.4.1.2.4 Identify Targets
      - 1.2.3.1.2.4.1.2.5 Conduct Post-Attack Target Damage Assessment
  - 1.2.3.1.2.4.2 Process Information

- 1.2.3.1.2.4.2.1 Evaluate Threat Information
  - 1.2.3.1.2.4.2.1.1 Review Holdings
  - 1.2.3.1.2.4.2.1.2 Consider Enemy Doctrine
- 1.2.3.1.2.4.2.2 Evaluate Physical Environment Information
  - 1.2.3.1.2.4.2.2.1 Review Holdings
  - 1.2.3.1.2.4.2.2.2 Consider Enemy Doctrine
  - 1.2.3.1.2.4.2.2.3 Develop Impacts
- 1.2.3.1.2.4.2.3 Evaluate Social/Political/Economic Environment
- 1.2.3.1.2.4.2.4 Integrate Intelligence Information
  - 1.2.3.1.2.4.2.4.1 Prepare Reports on Target Development
  - 1.2.3.1.2.4.2.4.2 Prepare Reports on Enemy Intentions
  - 1.2.3.1.2.4.2.4.3 Prepare Reports on Battlefield Area
  - 1.2.3.1.2.4.2.4.4 Prepare Reports on Enemy Situation
- 1.2.3.1.2.5 Mobility and Survivability BOS
  - 1.2.3.1.2.5.1 Provide Mobility
    - 1.2.3.1.2.5.1.1 Overcome Obstacles
      - 1.2.3.1.2.5.1.1.1 Breach Obstacles
        - 1.2.3.1.2.5.1.1.1.1 Breach Minefields
        - 1.2.3.1.2.5.1.1.1.2 Breach All Other Obstacles
      - 1.2.3.1.2.5.1.1.2 Reduce/Clear Obstacles
      - 1.2.3.1.2.5.1.1.3 Cross Gaps
    - 1.2.3.1.2.5.1.2 Enhance Movement
      - 1.2.3.1.2.5.1.2.1 Construct/Repair Combat Roads and Trails
      - 1.2.3.1.2.5.1.2.2 Construct/Repair Forward Airfields and Landing Zones
    - 1.2.3.1.2.5.1.3 Facilitate Movement on Routes
  - 1.2.3.1.2.5.2 Provide Counter-mobility
    - 1.2.3.1.2.5.2.1 Secure>Select Location of Obstacles
    - 1.2.3.1.2.5.2.2 Emplace Obstacles
      - 1.2.3.1.2.5.2.2.1 Emplace Mines
      - 1.2.3.1.2.5.2.2.2 Prepare/Emplace Constructed Obstacles
      - 1.2.3.1.2.5.2.2.3 Emplace Demolition Obstacles
      - 1.2.3.1.2.5.2.2.4 Emplace Chemical Obstacles

- 1.2.3.1.2.5.2.3 Mark Obstacles
- 1.2.3.1.2.5.2.4 Detonate Mines or Explosives
- 1.2.3.1.2.5.3 Enhance Survivability
  - 1.2.3.1.2.5.3.1 Provide Battlefield Hazard Protection
    - 1.2.3.1.2.5.3.1.1 Protect Individuals and Systems
      - 1.2.3.1.2.5.3.1.1.1 Employ Electronic Countermeasures
      - 1.2.3.1.2.5.3.1.1.2 Prepare Fighting Positions
      - 1.2.3.1.2.5.3.1.1.3 Prepare Protective Positions
      - 1.2.3.1.2.5.3.1.1.4 Employ Protective Equipment
    - 1.2.3.1.2.5.3.1.2 Remove Battlefield Hazards
      - 1.2.3.1.2.5.3.1.2.1 Decontaminate Personnel and Systems
      - 1.2.3.1.2.5.3.1.2.2 Provide Explosive Ordnance Disposal Support
  - 1.2.3.1.2.5.3.2 Employ Operations Security
    - 1.2.3.1.2.5.3.2.1 Employ Signal Security (SigSec)
      - 1.2.3.1.2.5.3.2.1.1 Employ Communications Security
        - 1.2.3.1.2.5.3.2.1.1.1 Employ Physical Security Measures
        - 1.2.3.1.2.5.3.2.1.1.2 Maintain Emission Security
      - 1.2.3.1.2.5.3.2.1.2 Maintain Other Electronic Security
    - 1.2.3.1.2.5.3.2.2 Employ Concealment Techniques
      - 1.2.3.1.2.5.3.2.2.1 Employ Camouflage
      - 1.2.3.1.2.5.3.2.2.2 Employ Noise, Light, and Physical Evidence Controls
      - 1.2.3.1.2.5.3.2.2.3 Employ Smoke Obscurants
  - 1.2.3.1.2.5.3.3 Conduct Deception in Support of Tactical Operations
    - 1.2.3.1.2.5.3.3.1 Employ Physical Deception
    - 1.2.3.1.2.5.3.3.2 Employ Electronic Deception
      - 1.2.3.1.2.5.3.3.2.1 Employ Initiative Electronic Deception
      - 1.2.3.1.2.5.3.3.2.2 Employ Simulative Electronic Deception
      - 1.2.3.1.2.5.3.3.2.3 Employ Manipulative Electronic Deception
- 1.2.3.1.2.6 Combat Service BOS
  - 1.2.3.1.2.6.1 Arm Weapons
  - 1.2.3.1.2.6.2 Fuel Vehicles
  - 1.2.3.1.2.6.3 Repair Equipment

- 1.2.3.1.2.6.3.1 Distribute Equipment
- 1.2.3.1.2.6.3.2 Repair or Maintain Equipment
  - 1.2.3.1.2.6.3.2.1 Perform Preventive Maintenance of Equipment
  - 1.2.3.1.2.6.3.2.2 Recover Equipment
  - 1.2.3.1.2.6.3.2.3 Diagnose Equipment
  - 1.2.3.1.2.6.3.2.4 Substitute Equipment
  - 1.2.3.1.2.6.3.2.5 Exchange Equipment
  - 1.2.3.1.2.6.3.2.6 Repair Equipment
  - 1.2.3.1.2.6.3.2.7 Return Equipment
- 1.2.3.1.2.6.4 Man the Force
  - 1.2.3.1.2.6.4.1 Distribute Support Services and Supplies
  - 1.2.3.1.2.6.4.2 Provide Field Services
    - 1.2.3.1.2.6.4.2.1 Provide Clothing Exchange and Bath
    - 1.2.3.1.2.6.4.2.2 Provide Graves Registration
    - 1.2.3.1.2.6.4.2.3 Salvage
    - 1.2.3.1.2.6.4.2.4 Provide Laundry and Renovation
    - 1.2.3.1.2.6.4.2.5 Provide Bakery
    - 1.2.3.1.2.6.4.2.6 Feed Personnel
  - 1.2.3.1.2.6.4.3 Provide Personnel Support Service
    - 1.2.3.1.2.6.4.3.1 Provide Personnel Administrative Service
      - 1.2.3.1.2.6.4.3.1.1 Maintain Personnel Strength
        - 1.2.3.1.2.6.4.3.1.1.1 Provide Strength Management
        - 1.2.3.1.2.6.4.3.1.1.2 Conduct Replacement Operations
      - 1.2.3.1.2.6.4.3.1.2 Perform Career Management Support
        - 1.2.3.1.2.6.4.3.1.2.1 Provide Officer Accessions Support
        - 1.2.3.1.2.6.4.3.1.2.2 Provide Promotions and Reductions Support
        - 1.2.3.1.2.6.4.3.1.2.3 Control Personnel Evaluation Reports
        - 1.2.3.1.2.6.4.3.1.2.4 Provide Awards and Decoration Support
        - 1.2.3.1.2.6.4.3.1.2.5 Record Personnel Information
      - 1.2.3.1.2.6.4.3.1.3 Provide Soldier Support Activities
        - 1.2.3.1.2.6.4.3.1.3.1 Conduct Postal Operations

- 1.2.3.1.2.6.4.3.1.3.2 Provide Morale, Welfare, and Recreational Activities
- 1.2.3.1.2.6.4.3.1.3.3 Provide Band Support
- 1.2.3.1.2.6.4.3.2 Provide Finance Services
  - 1.2.3.1.2.6.4.3.2.1 Provide Commercial Accounts Services
  - 1.2.3.1.2.6.4.3.2.2 Perform Pay Services
  - 1.2.3.1.2.6.4.3.2.3 Perform Disbursing Services
  - 1.2.3.1.2.6.4.3.2.4 Provide Accounting Services
  - 1.2.3.1.2.6.4.3.2.5 Provide Travel Pay
- 1.2.3.1.2.6.4.3.3 Provide Resource Management
- 1.2.3.1.2.6.4.3.4 Perform Chaplain Services
  - 1.2.3.1.2.6.4.3.4.1 Provide Religious Support
  - 1.2.3.1.2.6.4.3.4.2 Provide Pastoral Care and Counseling
  - 1.2.3.1.2.6.4.3.4.3 Advise on Moral and Ethical Issues
- 1.2.3.1.2.6.4.3.5 Provide Public Affairs Services
  - 1.2.3.1.2.6.4.3.5.1 Provide Command Information
  - 1.2.3.1.2.6.4.3.5.2 Advise/Assist in Community Relations
  - 1.2.3.1.2.6.4.3.5.3 Provide Public Information
- 1.2.3.1.2.6.4.3.6 Provide Legal Service Support
  - 1.2.3.1.2.6.4.3.6.1 Interpret Administrative/Contract Law
  - 1.2.3.1.2.6.4.3.6.2 Administer Criminal Law
  - 1.2.3.1.2.6.4.3.6.3 Conduct Claims
  - 1.2.3.1.2.6.4.3.6.4 Provide Legal Assistance
  - 1.2.3.1.2.6.4.3.6.5 Interpret International/Operational Law
- 1.2.3.1.2.6.4.4 Provide Health Services
  - 1.2.3.1.2.6.4.4.1 Provide Medical Treatment
  - 1.2.3.1.2.6.4.4.2 Evacuate Casualties
  - 1.2.3.1.2.6.4.4.3 Provide Preventive Medicine
  - 1.2.3.1.2.6.4.4.4 Provide Veterinary Services
- 1.2.3.1.2.6.4.5 Distribute Cargo, Equipment, and Personnel
  - 1.2.3.1.2.6.4.5.1 Provide Transport Services
    - 1.2.3.1.2.6.4.5.1.1 Conduct Terminal Operations
    - 1.2.3.1.2.6.4.5.1.1.1 Receive Requirement

- 1.2.3.1.2.6.4.5.1.1.2 Unload Cargo, Equipment, and Personnel
- 1.2.3.1.2.6.4.5.1.1.3 Load Cargo, Equipment, and Personnel
- 1.2.3.1.2.6.4.5.1.1.4 Provide Terminal Services
- 1.2.3.1.2.6.4.5.2 Move/Evacuate Cargo, Equipment, and Personnel
  - 1.2.3.1.2.6.4.5.2.1 Move by Surface
  - 1.2.3.1.2.6.4.5.2.2 Move by Air
- 1.2.3.1.2.6.4.6 Supply the Force
  - 1.2.3.1.2.6.4.6.1 Request Supplies
  - 1.2.3.1.2.6.4.6.2 Receive Supplies
  - 1.2.3.1.2.6.4.6.3 Produce Supplies
  - 1.2.3.1.2.6.4.6.4 Procure Supplies
  - 1.2.3.1.2.6.4.6.5 Store Supplies
  - 1.2.3.1.2.6.4.6.6 Protect Supplies
  - 1.2.3.1.2.6.4.6.7 Relocate Supplies
  - 1.2.3.1.2.6.4.6.8 Issue Supplies
- 1.2.3.1.2.6.5 Provide Sustainability Engineering
  - 1.2.3.1.2.6.5.1 Perform Rear-Area Restoration
  - 1.2.3.1.2.6.5.2 Perform Logistics Operations Center Sustainability
  - 1.2.3.1.2.6.5.3 Provide Engineer Construction Support
  - 1.2.3.1.2.6.5.4 Provide Engineer Construction Materials
- 1.2.3.1.2.6.6 Provide Military Police Support
  - 1.2.3.1.2.6.6.1 Perform Enemy Prisoner of War Operations
  - 1.2.3.1.2.6.6.2 Conduct Law and Order Operations
- 1.2.3.1.3 Operational Activities
  - 1.2.3.1.3.1 Perform Operational Movements and Maneuvers
    - 1.2.3.1.3.1.1 Conduct Operational Movement
      - 1.2.3.1.3.1.1.1 Formulate Request for Strategic Deployment of Joint/Combined Forces to Theater of Operations
      - 1.2.3.1.3.1.1.2 Conduct Intra-Theater Operations Deployment of Forces
    - 1.2.3.1.3.1.2 Conduct Operational Maneuvers
      - 1.2.3.1.3.1.2.1 Transition to and from Tactical Battle Formations
      - 1.2.3.1.3.1.2.2 Posture Forces for Operational Formations
      - 1.2.3.1.3.1.2.3 Conduct Operations in Depth

- 1.2.3.1.3.1.3. Provide Operational Mobility
  - 1.2.3.1.3.1.3.1. Overcome Operationally Significant Obstacles
  - 1.2.3.1.3.1.3.2. Enhance Movement of Operational Forces
- 1.2.3.1.3.1.4. Provide Operational Counter-mobility
  - 1.2.3.1.3.1.4.1. Select Location for Operational Forces
  - 1.2.3.1.3.1.4.2. Emplace Operational Systems of Obstacles
- 1.2.3.1.3.1.5. Control Operationally Significant Area
- 1.2.3.1.3.2. Direct Operational Fires
  - 1.2.3.1.3.2.1. Process Operational Targets
    - 1.2.3.1.3.2.1.1. Select Operational Targets for Attack
    - 1.2.3.1.3.2.1.2. Allocate Joint/Combined Operational Fires Resources
  - 1.2.3.1.3.2.2. Attack Operational Targets
    - 1.2.3.1.3.2.2.1. Conduct Lethal Attack on Operational Targets
      - 1.2.3.1.3.2.2.1.1. Conduct Attack With Surface/Subsurface-Based Operational Fires
      - 1.2.3.1.3.2.2.1.2. Conduct Aerospace Operational Fires Attack
    - 1.2.3.1.3.2.2.2. Conduct Non-lethal Attack on Operational Targets
      - 1.2.3.1.3.2.2.2.1. Reduce Enemy Operational Force Effectiveness
      - 1.2.3.1.3.2.2.2.2. Reduce Enemy Critical Facilities Effectiveness
      - 1.2.3.1.3.2.2.2.3. Integrate Operational Fires
- 1.2.3.1.3.3. Provide Operational Protection
  - 1.2.3.1.3.3.1. Provide Operational Air Defense
    - 1.2.3.1.3.3.1.1. Process Operational Air Defense Targets
      - 1.2.3.1.3.3.1.1.1. Allocate Targets for Attack
      - 1.2.3.1.3.3.1.1.2. Integrate Joint/Combined Operational Air Defense Forces
    - 1.2.3.1.3.3.1.2. Provide Airspace Control
      - 1.2.3.1.3.3.1.2.1. Employ Positive Control Measures
      - 1.2.3.1.3.3.1.2.2. Employ Procedural Control Measures
    - 1.2.3.1.3.3.1.3. Attack Enemy Air Defense Targets
      - 1.2.3.1.3.3.1.3.1. Conduct Lethal Attack on Operational Air Defense Targets
      - 1.2.3.1.3.3.1.3.2. Conduct Non-lethal Attack on Operational Air Defense Targets

- 1.2.3.1.3.3.2 Provide Protection for Operational Forces and Means
  - 1.2.3.1.3.3.2.1 Prepare Operationally Significant Fortifications
  - 1.2.3.1.3.3.2.2 Remove Operationally Significant Hazards
  - 1.2.3.1.3.3.2.3 Protect Use of Electromagnetic Spectrum
- 1.2.3.1.3.3.3 Employ Operations Security
  - 1.2.3.1.3.3.3.1 Employ Signal Security (SIGSEC)
  - 1.2.3.1.3.3.3.2 Employ Concealment Techniques
- 1.2.3.1.3.3.4 Conduct Deception in Support of Campaigns and Major Operations
  - 1.2.3.1.3.3.4.1 Protect Details of Campaigns and Major Operations
  - 1.2.3.1.3.3.4.2 Spread Misinformation Regarding Conduct of Operations
  - 1.2.3.1.3.3.4.3 Assess Effect of Operational Deception Plan
- 1.2.3.1.3.3.5 Provide Security for Operational Forces and Means
- 1.2.3.1.3.4 Provide Operational Command and Control
  - 1.2.3.1.3.4.1 Acquire and Communicate Operational Level Information and Maintain Status
    - 1.2.3.1.3.4.1.1 Communicate Operational Information
    - 1.2.3.1.3.4.1.2 Manage Means of Communicating Operational Information
    - 1.2.3.1.3.4.1.3 Maintain Operational Information and Force Status
    - 1.2.3.1.3.4.1.4 Monitor Strategic Situation
  - 1.2.3.1.3.4.2 Assess Operational Situation
    - 1.2.3.1.3.4.2.1 Review Current Situation
    - 1.2.3.1.3.4.2.2 Project Future Campaigns or Major Operations
    - 1.2.3.1.3.4.2.3 Decide on Need for Action or Change
  - 1.2.3.1.3.4.3 Determine Operational Actions
    - 1.2.3.1.3.4.3.1 Issue Planning Guidance
    - 1.2.3.1.3.4.3.2 Develop Courses of Action
    - 1.2.3.1.3.4.3.3 Analyze Courses of Action
    - 1.2.3.1.3.4.3.4 Compare Courses of Action
    - 1.2.3.1.3.4.3.5 Select or Modify Courses of Action
    - 1.2.3.1.3.4.3.6 Finalize Commander's Concept and Intent
  - 1.2.3.1.3.4.4 Direct and Lead Subordinate Operational Forces
  - 1.2.3.1.3.4.5 Prepare Initial Campaign or Major Operational Plans and Orders

- 1.2.3.1.3.4.5.1 Develop and Complete Operational Plans and Orders
  - 1.2.3.1.3.4.5.1.1 Coordinate Service Components, Theater Army, and Other Support
  - 1.2.3.1.3.4.5.1.2 Approve Plans and Orders
- 1.2.3.1.3.4.5.2 Issue Plans and Orders
- 1.2.3.1.3.4.5.3 Provide Operational Command Presence
- 1.2.3.1.3.4.5.4 Synchronize Operations
- 1.2.3.1.3.4.6 Employ Command, Control, and Communications (C<sup>3</sup>)
- 1.2.3.1.3.5 Provide Operational Intelligence
  - 1.2.3.1.3.5.1 Collect Operational Information
    - 1.2.3.1.3.5.1.1 Collect Information on Operational Situation and Hazards
    - 1.2.3.1.3.5.1.2 Collect Information on Operational Targets
  - 1.2.3.1.3.5.2 Process Operational Information
    - 1.2.3.1.3.5.2.1 Evaluate Operational Threat Information
    - 1.2.3.1.3.5.2.2 Analyze Area of Operations
    - 1.2.3.1.3.5.2.3 Integrate Operational Intelligence
      - 1.2.3.1.3.5.2.3.1 Develop Enemy Operational Intentions
      - 1.2.3.1.3.5.2.3.2 Develop Operational Target Information
    - 1.2.3.1.3.5.2.4 Develop Indications and Warnings
    - 1.2.3.1.3.5.2.5 Identify Friendly Vulnerables
  - 1.2.3.1.3.5.3 Prepare Operational Intelligence Reports
- 1.2.3.1.3.6 Provide Operational Support
  - 1.2.3.1.3.6.1 Arm Weapons
  - 1.2.3.1.3.6.2 Fuel Vehicles
  - 1.2.3.1.3.6.3 Repair/Maintain Equipment
  - 1.2.3.1.3.6.4 Man the Force
    - 1.2.3.1.3.6.4.1 Provide Field, Personnel, and Health Services
    - 1.2.3.1.3.6.4.2 Reconstitute Forces
    - 1.2.3.1.3.6.4.3 Train Units and Personnel
    - 1.2.3.1.3.6.4.4 Conduct Theater of Operations Reception Operations
  - 1.2.3.1.3.6.5 Distribute Cargo, Equipment, and Personnel
    - 1.2.3.1.3.6.5.1 Provide Movement Services
    - 1.2.3.1.3.6.5.2 Supply Operational Forces

- 1.2.3.1.3.6.6 Maintain Sustainability Base(s)
  - 1.2.3.1.3.6.6.1 Recommend Number and Location of Sustaining Base(s)
  - 1.2.3.1.3.6.6.2 Provide Sustainability Engineering
  - 1.2.3.1.3.6.6.3 Provide Law Enforcement and Prisoner Control
  - 1.2.3.1.3.6.7 Conduct Civil Affairs
  - 1.2.3.1.3.6.8 Evacuate Noncombatants from Theater of Operations
- 1.2.3.2 Conflict
  - 1.2.3.2.1 Level of Conflict
    - 1.2.3.2.1.1 High-intensity Conflict
    - 1.2.3.2.1.2 Mid-intensity Conflict
    - 1.2.3.2.1.3 Low-intensity Conflict
  - 1.2.3.3 Peace Time Competition
  - 1.2.3.4 Humanitarian Support
  - 1.2.3.5 Anti-Terrorism
  - 1.2.3.6 Counter Drug Activities
- 1.2.4 Defense Readiness Condition (DefCon)
  - 1.2.4.1 DefCon 5
  - 1.2.4.2 DefCon 4
  - 1.2.4.3 DefCon 3
  - 1.2.4.4 DefCon 2
  - 1.2.4.5 DefCon 1
- 1.3 Operator Environment
  - 1.3.1 Facility Description
    - 1.3.1.1 Facility Units
    - 1.3.1.2 User Categories
    - 1.3.1.3 Furnishing Allocations
    - 1.3.1.4 Facility Management Plan
    - 1.3.1.5 Alteration Expectancies
    - 1.3.1.6 User Activity Descriptions
    - 1.3.1.7 Environmental Control
  - 1.3.2 User Activity Support
    - 1.3.2.1 Furnishings and Hardware Design Criteria

- 1.3.2.2 Furnishings, Hardware, and User Placement
- 1.3.2.3 Ambient Environmental Criteria
- 1.3.2.4 Convenience, Safety, and Security
- 1.3.3 Surfaces
  - 1.3.3.1 User Effects Possibilities
  - 1.3.3.2 Color, Texture, and Pattern
  - 1.3.3.3 Durability and Maintainability
- 1.3.4 Circulation
  - 1.3.4.1 Information Flow
  - 1.3.4.2 User Flow
  - 1.3.4.3 Equipment and Material Flow
  - 1.3.4.4 Movement Priorities
  - 1.3.4.5 Circulation Pattern Summary
- 1.3.5 Spatial Configurations and Arrangements
  - 1.3.5.1 Space Requirements
  - 1.3.5.2 Unit Adjacencies
  - 1.3.5.3 Candidate Spatial Configurations and Arrangements
- 1.3.6 Location
  - 1.3.6.1 Area and Regional Integration
  - 1.3.6.2 Facility Orientations and Adjacencies
  - 1.3.6.3 Transportation Interface
- 1.3.7 Vibration (subsonic or sonic)
  - 1.3.7.1 Duration of Vibration
    - 1.3.7.1.1 Continuous Vibration [seconds]
    - 1.3.7.1.2 Impulsive Vibration [seconds]
    - 1.3.7.1.3 Intermittent Vibration [seconds]
  - 1.3.7.2 Frequency of Vibration
    - 1.3.7.2.1 Constant Frequency of Vibration [hertz]
    - 1.3.7.2.2 Variable Frequency of Vibration [hertz]
  - 1.3.7.3 Intensity of Vibration
    - 1.3.7.3.1 Constant Intensity of Vibration [dB relative to 1 picowatt]
    - 1.3.7.3.2 Variable Intensity of Vibration [dB relative to 1 picowatt]

#### 1.3.7.4 Acceleration

##### 1.3.7.4.1 Positive Force [g]

1.3.7.4.1.1 Linear Acceleration [meters per second per second;  $g_x$ ,  $g_y$ ,  $g_z$ ]

1.3.7.4.1.2 Angular Acceleration [radians per second per second;  $g_{\text{roll}}$ ,  $g_{\text{pitch}}$ ,  $g_{\text{yaw}}$ ]

#### 1.3.8 Noise (audible vibration)

##### 1.3.8.1 Duration of Noise

1.3.8.1.1 Continuous Noise [seconds]

1.3.8.1.2 Impulsive Noise [second]

1.3.8.1.3 Intermittent Noise [seconds]

##### 1.3.8.2 Frequency of Noise

1.3.8.2.1 Constant Frequency of Noise [hertz]

1.3.8.2.2 Variable Frequency of Noise [hertz]

##### 1.3.8.3 Intensity of Noise

1.3.8.3.1 Constant Intensity of Noise [dBA]

1.3.8.3.2 Variable Intensity of Noise [dBA]

##### 1.3.8.4 Noise Medium

1.3.8.4.1 Atmospheric Noise [dBA]

1.3.8.4.2 Communications Noise [dBA]

1.3.8.4.3 Hydrospheric Noise [dBA]

##### 1.3.8.5 Frequency Range of Noise

1.3.8.5.1 Sonic Noise [hertz]

1.3.8.5.2 Ultrasonic Noise [hertz]

##### 1.3.8.6 Reduced Zero Force [meters per second per second]

#### 1.3.9 Man-Made Lighting

##### 1.3.9.1 Type of Lighting

1.3.9.1.1 Fluorescent Lighting

1.3.9.1.2 Incandescent Lighting

1.3.9.1.2.1 White Light

1.3.9.1.2.2 Blue Light

1.3.9.1.2.3 Red Light

1.3.9.1.3 Solid-State Lighting

1.3.9.1.4 Gas Discharge Lighting (e. g. mercury vapor)

### 1.3.9.2 Attributes of Lighting

1.3.9.2.1 Luminance [lux]

1.3.9.2.2 Heat Produced [temperature increase in degrees Celsius]

1.3.9.2.3 Transmittance

1.3.9.2.3.1 Light Emitting Sources

1.3.9.2.3.1.1 Diffuse Light Sources

1.3.9.2.3.1.2 Direct Light Sources

1.3.9.2.3.2 Reflected Light Sources

1.3.9.2.4 Light Quality

1.3.9.2.4.1 Chromaticity

1.3.9.2.4.1.1 C. I. E. Coordinates

1.3.9.2.4.1.2 Chromaticity Shifts

1.3.9.2.4.1.2.1 Variation in Current or Voltage

1.3.9.2.4.1.2.2 Device Life

1.3.9.2.4.1.3 Perceived Colors

1.3.9.2.4.1.3.1 Photopic Vision

1.3.9.2.4.1.3.2 Scotopic Vision

1.3.9.2.4.1.3.3 Apparent Color Hue Changes

1.3.9.2.4.1.4 Wavelengths

1.3.9.2.4.1.5 Polarization

1.3.10 Optical Pressure [pascals]

1.3.10.1 Dynamic Pressure [pascals]

1.3.10.2 Static Pressure [pascals]

1.3.11 Virtual Environment

1.3.11.1 Interaction Tasks

1.3.11.1.1 Self-Movement

1.3.11.1.2 Navigation

1.3.11.1.3 Grab>Select

1.3.11.2 Perception Tasks

1.3.11.2.1 Depth

1.3.11.2.2 Surface Segregation

1.3.11.2.3 Displacement

- 1.3.11.2.4 Dynamics
- 1.3.11.2.5 Path Tracing
- 1.3.11.2.6 Visual Search/Detection
- 1.3.11.2.7 Identification
- 1.3.11.2.8 Comparison
- 1.3.11.2.9 Spatial Judgment
- 1.3.11.3 Cognition Tasks
  - 1.3.11.3.1 Problem Solving
  - 1.3.11.3.2 Categorization
  - 1.3.11.3.3 Classification
  - 1.3.11.3.4 Divided Attention
  - 1.3.11.3.5 Focused Attention
  - 1.3.11.3.6 Integrated Attention
- 1.3.12 Altitude [meters above sea level]
  - 1.3.12.1 Reduced Oxygen [parts per million]
  - 1.3.12.2 Partial Pressure [parts per million]

## 2 Mission

### 2.1 Scenario/Conditions (Same as Environment, Item 1)

- 2.1.1 Function
  - 2.1.1.1 Job
    - 2.1.1.1.1 Duty
      - 2.1.1.1.1.1 Task
        - 2.1.1.1.1.1.1 Subtask
          - 2.1.1.1.1.1.1.1 Task Element
            - 2.1.1.1.1.1.1.1.1 Type of Task Element
              - 2.1.1.1.1.1.1.1.1.1 Communication Element
                - 2.1.1.1.1.1.1.1.1.1.1 Type (Function) of Communication
                  - 2.1.1.1.1.1.1.1.1.1.1.1 Administration
                  - 2.1.1.1.1.1.1.1.1.1.1.2 Advice
                  - 2.1.1.1.1.1.1.1.1.1.1.3 Answering
                  - 2.1.1.1.1.1.1.1.1.1.4 Comprehension
                  - 2.1.1.1.1.1.1.1.1.1.5 Consultation

- 2.1.1.1.1.1.1.1.1.6 Coordination
- 2.1.1.1.1.1.1.1.1.1.7 Direction
- 2.1.1.1.1.1.1.1.1.1.8 Indicating
- 2.1.1.1.1.1.1.1.1.1.9 Informing
- 2.1.1.1.1.1.1.1.1.1.10 Instruction
- 2.1.1.1.1.1.1.1.1.1.11 Investigation
- 2.1.1.1.1.1.1.1.1.1.12 Negotiation
- 2.1.1.1.1.1.1.1.1.1.13 Reception
- 2.1.1.1.1.1.1.1.1.1.14 Requesting
- 2.1.1.1.1.1.1.1.1.1.1.15 Speaking (job- or public-related)
- 2.1.1.1.1.1.1.1.1.1.1.16 Supervision
- 2.1.1.1.1.1.1.1.1.1.1.17 Transmission
- 2.1.1.1.1.1.1.1.1.2 Attributes of Communication
  - 2.1.1.1.1.1.1.1.1.2.1 Oral Communication
  - 2.1.1.1.1.1.1.1.1.2.2 Written Communication
- 2.1.1.1.1.1.1.1.1.3 Mediation Element
  - 2.1.1.1.1.1.1.1.1.1.3.1 Type (Function) of Mediation
  - 2.1.1.1.1.1.1.1.1.1.3.2 Information Processing
- 2.1.1.1.1.2 Categorization
- 2.1.1.1.1.3 Calculation (mathematical operators)
- 2.1.1.1.1.4 Coding
- 2.1.1.1.1.5 Computation (logical operators)
- 2.1.1.1.1.6 Interpolation
- 2.1.1.1.1.7 Itemization
- 2.1.1.1.1.8 Learning
- 2.1.1.1.1.9 Tabulation
- 2.1.1.1.1.10 Translation
- 2.1.1.1.2 Problem Solving and Decision Making [time in seconds, number of errors]
  - 2.1.1.1.2.1 Analysis
  - 2.1.1.1.2.2 Deduction
  - 2.1.1.1.2.3 Induction
  - 2.1.1.1.2.4 Calculation (mathematical operators)

- 2.1.1.1.2.5 Comparison and/or Ordering
- 2.1.1.1.2.6 Computation (logical operators)
- 2.1.1.1.2.7 Estimation
- 2.1.1.1.2.8 Integration
- 2.1.1.1.2.9 Planning
- 2.1.1.1.2.10 Selection
  - 2.1.1.1.2.10.1 Selecting from Known Alternatives
  - 2.1.1.1.2.10.2 Selecting from Unknown Alternatives
  - 2.1.1.1.2.10.3 Selecting from Unspecified Alternatives
- 2.1.1.1.2.11 Supervision
- 2.1.1.1.2.12 Prediction of Occurrence of an Event
- 2.1.1.1.3 Recollection
  - 2.1.1.1.3.1 Recollection of Facts
  - 2.1.1.1.3.2 Recollection of Principles
  - 2.1.1.1.3.3 Recollection of Procedures
  - 2.1.1.1.3.4 Timesharing
- 2.1.1.2 Attributes of Mediation
  - 2.1.1.2.1 Complexity
  - 2.1.1.2.2 Difficulty
- 2.1.2 Motor Processes Element
  - 2.1.2.1 Type (Function) of Motor Process
    - 2.1.2.1.1 Complex Continuous Processes
      - 2.1.2.1.1.1 Adjustment
      - 2.1.2.1.1.2 Alignment
      - 2.1.2.1.1.3 Insertion of Object
      - 2.1.2.1.1.4 Regulation
      - 2.1.2.1.1.5 Removal of Object
      - 2.1.2.1.1.6 Synchronization
      - 2.1.2.1.1.7 Tracking
        - 2.1.2.1.1.7.1 Visual Tracking Only
        - 2.1.2.1.1.7.2 Visual Tracking Plus Position Plotting
      - 2.1.2.1.1.8 Typing Message on Keyboard

- 2.1.2.1.1.9 Writing
- 2.1.2.1.2 Compound Processes
- 2.1.2.1.3 Reflex Processes
  - 2.1.2.1.3.1 Inter-segmental Processes
  - 2.1.2.1.3.2 Segmental Processes
  - 2.1.2.1.3.3 Supra-segmental Processes
- 2.1.2.1.4 Simple Discrete Processes
  - 2.1.2.1.4.1 Activation
  - 2.1.2.1.4.2 Closing
  - 2.1.2.1.4.3 Connection
  - 2.1.2.1.4.4 Disconnection
  - 2.1.2.1.4.5 Joining
  - 2.1.2.1.4.6 Moving
    - 2.1.2.1.4.6.1 Lifting Object
    - 2.1.2.1.4.6.2 Dropping Object
    - 2.1.2.1.4.6.3 Swimming
    - 2.1.2.1.4.6.4 Controlling Vehicle
    - 2.1.2.1.4.6.5 Running
    - 2.1.2.1.4.6.6 Walking
  - 2.1.2.1.4.7 Pressing
  - 2.1.2.1.4.8 Setting
- 2.1.2.1.4.9 Turning Single Rotary Control
- 2.1.2.2 Attributes of Motor Process
  - 2.1.2.2.1 Ballistic Task
  - 2.1.2.2.2 Continuous Task
  - 2.1.2.2.3 Coordinated Task
  - 2.1.2.2.4 Fine Task
  - 2.1.2.2.5 Gross Task
  - 2.1.2.2.6 Repetitive Task
  - 2.1.2.2.7 Serial Task
  - 2.1.2.2.8 Static Task
- 2.1.3 Perceptual Processes Element

2.1.3.1 Searching For and Receiving Information

2.1.3.1.1 Detection

2.1.3.1.2 Detection of Nonverbal Cues or Movement

2.1.3.1.3 Detection of Verbal Cues

2.1.3.1.2 Inspection

2.1.3.1.3 Observation

2.1.3.1.4 Reading

2.1.3.1.5 Reception

2.1.3.1.6 Scanning

2.1.3.1.7 Surveying

2.1.3.2 Identification of Objects, Actions, Events

2.1.3.2.1 Discrimination

2.1.3.2.1.1 Discrimination of Auditory Cues

2.1.3.2.1.1.1 Discrimination of Nonverbal Cues

2.1.3.2.1.1.2 Discrimination of Verbal Cues

2.1.3.2.1.2 Discrimination of Kinetic Cues

2.1.3.2.1.3 Discrimination of Tactile Cues

2.1.3.2.1.4 Discrimination of Visual Cues

2.1.3.2.2 Identification

2.1.3.2.2.1 Identification of Nonverbal Cues

2.1.3.2.2.2 Identification of Verbal Cues

2.1.3.2.3 Recognition

2.1.3.2.3.1 Recognition of Nonverbal Cues

2.1.3.2.3.2 Recognition of Verbal Cues

2.2 Attributes of Task Element

2.2.1 Amount of Labor Required for Task Element

2.2.2 Complexity of Task Element

2.2.3 Degree of Response Chaining for Task Element

2.2.4 Difficulty of Task Element

2.2.5 Knowledge of Results of Task Element

2.2.6 Output of Task Element

2.2.7 Pacing of Task Element

- 2.2.8 Precision of Task Element
- 2.2.9 Repetitiveness of Task Element
- 2.2.10 Skill Demands of Task Element
- 2.2.11 Simultaneity of Responses for Task Element
- 2.2.12 Task Autonomy
- 2.2.13 Task Allocation
- 2.2.14 Task Payoff Matrix

### 2.3 Constraints and Limitations

- 2.3.1 Time Constraints [minutes]
- 2.3.2 Space Constraints [meters]
- 2.3.3 Support Constraints
- 2.3.4 Weapon Deployment Constraints (conventional, nuclear, chemical)

## 3 Human

### 3.1 Physical State

#### 3.1.1 Physical Dimensions (NASA TN-1024 Dimensions)

- 3.1.1.1 Body Size
  - 3.1.1.1.1 Length
  - 3.1.1.1.2 Girth
  - 3.1.1.1.3 Functional Measures
- 3.1.1.2 Body Weight
- 3.1.1.3 Body Proportions
- 3.1.1.4 Center of Mass
- 3.1.1.5 Body Build

#### 3.1.2 Physical Capabilities

- 3.1.2.1 Strength
  - 3.1.2.1.1 Isometric
  - 3.1.2.1.2 Isotonic
  - 3.1.2.1.3 Isokinetic
  - 3.1.2.1.4 Isoinertial
- 3.1.2.2 Endurance
  - 3.1.2.2.1 Duration
  - 3.1.2.2.2 Repetition

- 3.1.2.2.3 Recovery
- 3.1.2.3 Muscular Fatigue
- 3.1.2.4 Fitness
- 3.1.2.5 Mobility
- 3.1.2.6 Posture
- 3.1.2.7 Work Capacity
- 3.1.2.8 Coordination
- 3.1.2.9 Fatigability
  - 3.1.2.9.1 Physical Neural Impedance
  - 3.1.2.9.2 Mental Fatigability and Neuro-psychiatric Fatalities
  - 3.1.2.9.3 Sleep Deprivation
- 3.1.2.10 Feet
  - 3.1.2.10.1 Foot Agility
  - 3.1.2.10.2 Foot Dominance (left or right)
  - 3.1.2.10.3 Foot Lift Strength [kilograms]
- 3.1.2.11 Hands
  - 3.1.2.11.1 Hand Dominance (left or right)
  - 3.1.2.11.2 Hand Flexibility
  - 3.1.2.11.3 Grip Strength [newtons]
- 3.1.2.12 Voice
- 3.1.2.13 Legs
  - 3.1.2.13.1 Leg Endurance
  - 3.1.2.13.2 Leg Lift Strength [kilograms]
- 3.1.2.14 Arms
  - 3.1.2.14.1 Arm Endurance
  - 3.1.2.14.2 Arm Length [meters]
- 3.1.3 Gender Differences
  - 3.1.3.1 Anthropometry
  - 3.1.3.2 Strength and Endurance
  - 3.1.3.3 Physiological Responses
- 3.1.4 Commercial Workplace Design
  - 3.1.4.1 Office

- 3.1.4.2 Maintenance
- 3.1.4.3 Factory
- 3.1.4.4 Construction
- 3.1.4.5 Vehicles
- 3.1.4.6 Tool Use
- 3.1.4.7 Manual Materials Handling
- 3.1.5 Military Workplace Design
  - 3.1.5.1 Design Accommodation Policies
  - 3.1.5.2 Physical Selection Standards
  - 3.1.5.3 Combat Environments
- 3.1.6 Athletics
  - 3.1.6.1 Performance
  - 3.1.6.2 Training
- 3.1.7 Physically Disabled
  - 3.1.7.1 Muscular
  - 3.1.7.2 Skeletal
  - 3.1.7.3 Hearing Loss
  - 3.1.7.4 Vision Impairment
- 3.1.8 Environmental Effects
  - 3.1.8.1 Acceleration
  - 3.1.8.2 Vibration
  - 3.1.8.3 Comfort
  - 3.1.8.4 Temperature
  - 3.1.8.5 Altitude and Pressure
- 3.1.9 Physical Surrogates
  - 3.1.9.1 Manikins
  - 3.1.9.2 Computer Models
    - 3.1.9.2.1 Anthropometrics Models
    - 3.1.9.2.2 Biomechanical Models
    - 3.1.9.2.3 Ergonomic Models
- 3.1.10 Physiology
  - 3.1.10.1 Body Surface Area [square meters]

- 3.1.10.2 Effective Surface Area for Evaporation [square meters]
- 3.1.10.3 Average Skin Temperature [degrees Celsius]
- 3.1.10.4 Water Vapor Pressure at Skin [kilopascals]
- 3.1.10.5 Body Core Temperature [degrees Celsius]
- 3.1.10.6 Body Needs
  - 3.1.10.6.1 Fluid Intake [milliliters per hour]
  - 3.1.10.6.2 Eating [joules]
  - 3.1.10.6.3 Elimination [milliliters urine and kilograms feces per day]
- 3.1.10.7 Heart Rate [beats per minute]
- 3.1.10.8 Blood Pressure
  - 3.1.10.8.1 Diastolic Pressure [kilopascals]
  - 3.1.10.8.2 Systolic Pressure [kilopascals]
- 3.1.10.9 Respiration
  - 3.1.10.9.1 Hyperventilation
  - 3.1.10.9.2 Respiratory Burden
  - 3.1.10.9.3 Maximum Expiration Rate [cubic meters per second]

## 3.2 Mental State

- 3.2.1 Attention Span [seconds]
- 3.2.2 Memory
  - 3.2.2.1 Long-Term Memory
    - 3.2.2.1.1 Training
      - 3.2.2.1.1.1 Type of Training
      - 3.2.2.1.1.2 Amount of Training
      - 3.2.2.1.1.3 Skill Level of Training
      - 3.2.2.1.1.4 Frequency of Training
      - 3.2.2.1.1.5 Recency of Training
    - 3.2.2.1.2 Short-Term Memory
      - 3.2.2.1.2.1 Number of Items Stored in Memory
  - 3.2.3 Personality Traits
    - 3.2.3.1 Perceived Probability of Success
    - 3.2.3.2 Leadership Traits
      - 3.2.3.2.1 Intelligence

- 3.2.3.2.2 Self-Confidence
- 3.2.3.2.3 Initiative
- 3.2.3.2.4 Self-Knowledge
- 3.2.3.2.5 Integrity
- 3.2.3.2.6 Responsibility
- 3.2.3.2.7 Courage
- 3.2.3.2.8 Decisiveness
- 3.2.3.2.9 Personality Characteristics
- 3.2.3.3 Courage or Cowardice
- 3.2.3.4 Machismo
- 3.2.3.5 Will to Live
- 3.2.3.6 Tenacity
- 3.2.4 Emotions
  - 3.2.4.1 Fear
  - 3.2.4.2 Anger
  - 3.2.4.3 Frustration
  - 3.2.4.4 Hate
  - 3.2.4.5 Altruism
  - 3.2.4.6 Sadness or Grief
  - 3.2.4.7 Anxiety
  - 3.2.4.8 Patriotism
  - 3.2.4.9 Willingness to Fight
  - 3.2.4.10 Motivation
    - 3.2.4.10.1 Incentive
    - 3.2.4.10.2 Need
      - 3.2.4.10.2.1 Physiological Need
      - 3.2.4.10.2.2 Safety
      - 3.2.4.10.2.3 Security
      - 3.2.4.10.2.4 Affiliation
      - 3.2.4.10.2.5 Esteem
      - 3.2.4.10.2.6 Self-Actualization
    - 3.2.4.10.3 Reward Potential

- 3.2.4.10.3.1 Perceived Value
- 3.2.4.10.3.2 Likelihood of Qualifying
- 3.2.4.10.3.3 Likelihood of Receipt After Qualifying
- 3.2.4.11 Level of Responsibility
- 3.2.5 Experience
  - 3.2.5.1 Success Under Duress
  - 3.2.5.2 Success with Naiveté
  - 3.2.5.3 Understanding of Task
  - 3.2.5.4 Birth Order
  - 3.2.5.5 Combat Experience [years]
- 3.2.6 Cognition
  - 3.2.6.1 Reading Level
  - 3.2.6.2 Armed Services Vocational Aptitude Test (ASVAT)
  - 3.2.6.3 Learning Skills
    - 3.2.6.3.1 Conditional Learning Ability
    - 3.2.6.3.2 Associative Learning Ability
- 3.2.7 Intelligence
- 3.2.8 Abilities
  - 3.2.8.1 Decision Making
  - 3.2.8.2 Flexibility of Closure
  - 3.2.8.3 Detection
    - 3.2.8.3.1 Perceptual Speed
    - 3.2.8.3.2 Response Orientation
  - 3.2.8.4 Fine Manipulation
    - 3.2.8.4.1 Manual Dexterity
    - 3.2.8.4.2 Finger Dexterity
  - 3.2.8.5 Gross Manipulation
    - 3.2.8.5.1 Multi-limb Coordination
    - 3.2.8.5.2 Speed of Arm Movement
    - 3.2.8.5.3 Rate Control
    - 3.2.8.5.4 Arm Steadiness
    - 3.2.8.5.5 Wrist or Finger Speed

- 3.2.8.5.6 Aiming
  - 3.2.8.6 Numeric Manipulation
  - 3.2.8.7 Probability Estimation
  - 3.2.8.8 Recognition
  - 3.2.8.9 Team Coordination
  - 3.2.8.10 Time Estimation
  - 3.2.8.11 Time Sharing or Selective Attention
  - 3.2.8.12 Tracking
  - 3.2.8.13 Communication
  - 3.2.8.14 Space Estimation
- 3.2.9 Work Schedule
- 3.2.9.1 Days on Duty [number]
  - 3.2.9.2 Duty Hours (start and end) [times of day]
  - 3.2.9.3 Rest Periods
    - 3.2.9.3.1 Duration [minutes]
    - 3.2.9.3.2 Frequency [number per duty day]
  - 3.2.9.4 Rotation of Task
- 3.3 Senses
- 3.3.1 Type of Sense
- 3.3.1.1 Audition
    - 3.3.1.1.1 Binaural Hearing
    - 3.3.1.1.2 Binaural Hearing
    - 3.3.1.1.3 Tone Perception
  - 3.3.1.2 Olfaction
  - 3.3.1.3 Tactility
  - 3.3.1.4 Vision
    - 3.3.1.4.1 Visual Accommodation
    - 3.3.1.4.2 Visual Acuity
    - 3.3.1.4.3 Binocular Vision
    - 3.3.1.4.4 Color Perception
      - 3.3.1.4.4.1 Chromatic Adaptation
      - 3.3.1.4.4.2 Purkinje Shift

- 3.3.1.4.5 Visual Convergence
- 3.3.1.4.6 Monocular Vision
- 3.3.1.5 Gustation
- 3.3.1.6 Vestibular Balance
- 3.3.2 Attributes of Senses
  - 3.3.2.1 Sensory Parameters
    - 3.3.2.1.1 Sensory Thresholds
    - 3.3.2.1.2 Sensory Response Spectra
    - 3.3.2.1.3 Sensory Discrimination
    - 3.3.2.1.4 Sensory Habituation
  - 3.3.2.2 Sensory Degradation
    - 3.3.2.2.1 Sensory Fatigue
    - 3.3.2.2.2 Sensory Stress
    - 3.3.2.2.3 Sensory Overload
    - 3.3.2.2.4 Sensory Conflict
- 3.4 Health
  - 3.4.1 Effects of Drugs Used (prescription or over-the-counter)
    - 3.4.1.1 Type of Drug
    - 3.4.1.2 Drug Attributes
      - 3.4.1.2.1 Drug Dosage
      - 3.4.1.2.2 Number of Days Since Drug Last Taken
      - 3.4.1.2.3 Number of Days Drug Taken
  - 3.4.2 Fatigue State
  - 3.4.3 Injury
    - 3.4.3.1 Rash
    - 3.4.3.2 Hypothermia (frostbite)
    - 3.4.3.3 Hyperthermia (sunburn)
    - 3.4.3.4 Wounds
      - 3.4.3.4.1 Blisters
      - 3.4.3.4.2 Burns
      - 3.4.3.4.3 Hemorrhage
      - 3.4.3.4.4 Cuts

- 3.4.3.4.5 Eye Injury
- 3.4.3.4.6 Fracture
- 3.4.3.4.7 Sprain
- 3.4.3.5 Allergic Reaction
- 3.4.3.6 Temporary Deafness
- 3.4.4 Sickness
  - 3.4.4.1 Disease
    - 3.4.4.1.1 Dysentery
    - 3.4.4.1.2 Diarrhea
    - 3.4.4.1.3 Influenza
    - 3.4.4.1.4 Malaria
    - 3.4.4.1.5 Respiratory Infection (general)
    - 3.4.4.1.6 Trench Foot
    - 3.4.4.1.7 Yellow Fever
  - 3.4.4.2 Dehydration [liters]
    - 3.4.4.2.1 Dehydration Resulting from Diarrhea
    - 3.4.4.2.2 Membrane Dehydration
    - 3.4.4.2.3 Perspiration
    - 3.4.4.2.4 Respiratory Water Loss
    - 3.4.4.2.5 Skin Dehydration
  - 3.4.4.3 Nausea
  - 3.4.4.4 Pain
  - 3.4.4.5 Environmental Stressor Effects
    - 3.4.4.5.1 Motion Sickness
    - 3.4.4.5.2 Radiation Sickness
- 3.4.5 Mental Illness
  - 3.4.5.1 Illusion
  - 3.4.5.2 Hallucination
  - 3.4.5.3 Depression
  - 3.4.5.4 Battle Fatigue
- 3.4.6 Poor Nutrition
- 3.4.7 Fitness

- 3.4.7.1 Dynamic Flexibility
- 3.4.7.2 Dynamic Strength
- 3.4.7.3 Equilibrium
- 3.4.7.4 Explosive Strength
- 3.4.7.5 Extent of Flexibility
- 3.4.7.6 Gross Body Coordination
- 3.4.7.7 Stamina
- 3.4.7.8 Static Strength
- 3.4.7.9 Trunk Strength

### 3.5 Demographics

- 3.5.1 Age [years]
- 3.5.2 Gender
  - 3.5.2.1 Male
  - 3.5.2.2 Female
- 3.5.3 Handedness
  - 3.5.3.1 Left
  - 3.5.3.2 Right
  - 3.5.3.3 Ambidextrous
- 3.5.4 Birthplace [country/state/province]
- 3.5.5 Father's Birthplace [country/state/province]
- 3.5.6 Mother's Birthplace [country/state/province]
- 3.5.7 Ethnic Group
  - 3.5.7.1 Black
  - 3.5.7.2 Caucasian
  - 3.5.7.3 Hispanic
  - 3.5.7.4 Oriental

## 4 System

### 4.1 Machine

- 4.1.1 Vehicle
  - 4.1.1.1 Aircraft
    - 4.1.1.1.1 Fixed Wing (Mil-Std-203)
    - 4.1.1.1.2 Rotary Wing (Mil-Std 250)

- 4.1.1.1.3 Airship
  - 4.1.1.2 Motorized Ground Vehicle
    - 4.1.1.2.1 Car
    - 4.1.1.2.2 Halftrack
    - 4.1.1.2.3 Jeep
    - 4.1.1.2.4 Tank
    - 4.1.1.2.5 Truck
    - 4.1.1.2.6 Other Armored Vehicle
      - 4.1.1.2.6.1 Wheeled Vehicle
      - 4.1.1.2.6.2 Tracked Vehicle
  - 4.1.1.3 Ship
    - 4.1.1.3.1 Surface Ship
    - 4.1.1.3.2 Hovercraft
    - 4.1.1.3.3 Hydrofoil
    - 4.1.1.3.4 Submarine
  - 4.1.1.4 Spacecraft
  - 4.1.1.5 Maintenance Status of Vehicle
  - 4.1.1.6 Operability of Vehicle
- 4.1.2 Frame
    - 4.1.2.1 Structure (JTCG)
    - 4.1.2.2 Control System (JTCG)
      - 4.1.2.2.1 Hydraulic Control
      - 4.1.2.2.2 Electronic Control
      - 4.1.2.2.3 Automatic Control
    - 4.1.2.3 Fluid or Pneumatic Power (JTCG)
    - 4.1.2.4 Armor (JTCG)
  - 4.1.3 Electrical Power Distribution
  - 4.1.4 Propulsion or Power Unit (JTCG)
    - 4.1.4.1 Engine
    - 4.1.4.2 Fuel (JTCG)
    - 4.1.4.3 Power Trains (JTCG)
  - 4.1.5 Communications (Mil-Std 881)

4.1.6 Navigation and Guidance (Mil-Std 881)

4.1.7 Armament

    4.1.7.1 Fire Control

    4.1.7.2 Weapons Delivery Equipment

    4.1.7.3 Auxiliary Armament/Weapons Delivery Equipment

4.1.8 Auxiliary Equipment (Mil-Std 881)

    4.1.8.1 Penetration Aids

    4.1.8.2 Reconnaissance Equipment

    4.1.8.3 Central Integrated Checkout

4.1.9 Avionics and Sensors

    4.1.9.1 Radar

    4.1.9.2 Sonar

    4.1.9.3 Electro-optical

    4.1.9.4 Antisubmarine Warfare

    4.1.9.5 Damage Suppression

        4.1.9.5.1 Active

            4.1.9.5.1.1 Ballistically Resistant

            4.1.9.5.1.2 Ballistically Tolerant

            4.1.9.5.1.3 Component Elimination

        4.1.9.5.2 Passive

            4.1.9.5.2.1 Ballistic Resistance

            4.1.9.5.2.2 Damage Tolerance

            4.1.9.5.2.3 Delayed Failure

            4.1.9.5.2.4 Fail-Safe Response

            4.1.9.5.2.5 Explosive Suppression

            4.1.9.5.2.6 Leakage Suppression

        4.1.9.5.3 Signature

            4.1.9.5.3.1 Aural

            4.1.9.5.3.2 Infrared

            4.1.9.5.3.3 Radar

            4.1.9.5.3.4 Visual

4.1.10 Crew System

- 4.1.10.1 Crew Escape (DH2-2; DH2-8)
  - 4.1.10.1.1 Escape (DH2-2; DH2-8)
    - 4.1.10.1.1.1 In-flight (DH2-2; DH2-8)
      - 4.1.10.1.1.1.1 Assisted (DH2-2; DH2-8)
        - 4.1.10.1.1.1.1.1 Ejection Seat (DH2-8)
        - 4.1.10.1.1.1.1.2 Extracted (DH2-8)
        - 4.1.10.1.1.1.1.3 Module (DH2-8)
      - 4.1.10.1.1.1.2 Unassisted (Manual Bailout; DH2-8)
    - 4.1.10.1.1.2 Surface (DH2-8)
      - 4.1.10.1.1.2.1 Land (DH2-8)
        - 4.1.10.1.1.2.1.1 Rope Slides (DH2-2)
        - 4.1.10.1.1.2.1.2 Pole Slides (DH2-2)
        - 4.1.10.1.1.2.1.3 Evacuation Slides (DH2-2)
      - 4.1.10.1.1.2.2 Water (DH2-8)
        - 4.1.10.1.1.2.2.1 Ditching Assists (DH2-2)
        - 4.1.10.1.1.2.2.2 Life Boats
    - 4.1.10.1.2 Descent (DH2-8)
      - 4.1.10.1.2.1 Parachute (Free; DH2-8)
      - 4.1.10.1.2.2 Balloon (Discretionary; DH2-8)
      - 4.1.10.1.2.3 Controlled
        - 4.1.10.1.2.3.1 Rotary Wing (DH2-8)
        - 4.1.10.1.2.3.2 Fixed Wing (DH2-8)
        - 4.1.10.1.2.3.3 Flexible Wing (DH2-8)
        - 4.1.10.1.2.3.4 Controllable Parachute (DH2-8)
  - 4.1.10.2 Crew Station (JTCA)
    - 4.1.10.2.1 Control Device
      - 4.1.10.2.1.1 Type
        - 4.1.10.2.1.1.1 Rotary Control
          - 4.1.10.2.1.1.1.1 Knobs (potentiometer or valve)
          - 4.1.10.2.1.1.1.2 Wheel
            - 4.1.10.2.1.1.1.2.1 Steering
            - 4.1.10.2.1.1.1.2.2 Thumb

- 4.1.10.2.1.1.3 Hand Crank
- 4.1.10.2.1.1.2 Linear Control
  - 4.1.10.2.1.1.2.1 Pushbuttons
  - 4.1.10.2.1.1.2.2 Toggle Switch
  - 4.1.10.2.1.1.2.3 Rocker Switch
  - 4.1.10.2.1.1.2.4 Pedals
  - 4.1.10.2.1.1.2.5 Levers
  - 4.1.10.2.1.1.2.6 Rotary Selector Switch
- 4.1.10.2.1.1.3 Joy Stick Control
  - 4.1.10.2.1.1.3.1 Control Stick
    - 4.1.10.2.1.1.3.1.1 Movable
    - 4.1.10.2.1.1.3.1.2 Pressure Sensitive
  - 4.1.10.2.1.1.3.2 Joy Stick
- 4.1.10.2.1.1.4 Trackball Control
- 4.1.10.2.1.1.5 Touch Sensitive Control
  - 4.1.10.2.1.1.5.1 Keyboard
    - 4.1.10.2.1.1.5.1.1 Membrane
    - 4.1.10.2.1.1.5.1.2 Button
  - 4.1.10.2.1.1.5.2 Touch Panel (capacitive or other non-membrane)
  - 4.1.10.2.1.1.5.3 Touch Screen
- 4.1.10.2.1.1.6 Sound-Actuated Control
  - 4.1.10.2.1.1.6.1 Voice-Activated Control
- 4.1.10.2.1.1.7 Virtual Control
- 4.1.10.2.1.1.8 Motion-Actuated Control
  - 4.1.10.2.1.1.8.1 Mouse
  - 4.1.10.2.1.1.8.2 Eye Tracker
  - 4.1.10.2.1.1.8.3 Dead-Man Controls
- 4.1.10.2.1.1.9 Light Pen
- 4.1.10.2.1.2 Actuation
  - 4.1.10.2.1.2.1 Actuation Force
  - 4.1.10.2.1.2.2 Angular Range of Control [degrees-linear, rotational, or conical]
  - 4.1.10.2.1.2.3 Direction of Actuation

- 4.1.10.2.1.2.4 Design to Prevent Inadvertent Actuation
  - 4.1.10.2.1.2.4.1 Control Separation Distance
  - 4.1.10.2.1.2.4.2 Guards
  - 4.1.10.2.1.2.4.3 Covers
- 4.1.10.2.1.2.5 Multiple Actuation Steps
  - 4.1.10.2.1.2.5.1 Number of Control Positions
  - 4.1.10.2.1.2.5.2 Detents
  - 4.1.10.2.1.2.5.3 Actuation Feedback
    - 4.1.10.2.1.2.5.3.1 Tactile
    - 4.1.10.2.1.2.5.3.2 Visual
    - 4.1.10.2.1.2.5.3.3 Aural
  - 4.1.10.2.1.2.5.4 Discrete or Continuous
- 4.1.10.2.1.3 Size or Shape
  - 4.1.10.2.1.3.1 Standardized Shapes
  - 4.1.10.2.1.3.2 Non-standard Shapes
- 4.1.10.2.1.4 Location
- 4.1.10.2.1.5 Color
- 4.1.10.2.1.6 Labeling
- 4.1.10.2.1.7 Implementation Strategy
  - 4.1.10.2.1.7.1 Backup Required
  - 4.1.10.2.1.7.2 By Consent
  - 4.1.10.2.1.7.3 Dual or Blended Input
  - 4.1.10.2.1.7.4 Management by Exception
  - 4.1.10.2.1.7.5 Manual
  - 4.1.10.2.1.7.6 Override Required
- 4.1.10.2.1.8 Control Position Feedback
  - 4.1.10.2.1.8.1 Tactile
  - 4.1.10.2.1.8.2 Visual
  - 4.1.10.2.1.8.3 Aural
- 4.1.10.2.1.9 Mode of Operation
  - 4.1.10.2.1.9.1 Continuous Action
  - 4.1.10.2.1.9.2 Dual Action

4.1.10.2.1.9.3 Single Action

4.1.10.2.1.10 Response Time

    4.1.10.2.1.10.1 Initial

    4.1.10.2.1.10.2 Update Rate

4.1.10.2.1.11 Type of Control Damping

    4.1.10.2.1.11.1 Aural

    4.1.10.2.1.11.2 Visual

    4.1.10.2.1.11.3 Tactile

4.1.10.2.2 Control Panel

4.1.10.2.3 Type of Display Device

    4.1.10.2.3.1 Auditory

        4.1.10.2.3.1.1 Electromechanical Display

            4.1.10.2.3.1.1.1 Bell

            4.1.10.2.3.1.1.2 Buzzer

            4.1.10.2.3.1.1.3 Horn

            4.1.10.2.3.1.1.4 Siren

    4.1.10.2.3.2 Visual

        4.1.10.2.3.2.1 Cathode Ray Tube

            4.1.10.2.3.2.1.1 Raster

            4.1.10.2.3.2.1.2 Stroke

            4.1.10.2.3.2.1.3 Hybrid

            4.1.10.2.3.2.1.4 Etched or Permanent

            4.1.10.2.3.2.1.5 Virtual

        4.1.10.2.3.2.2 Electronic Display

            4.1.10.2.3.2.2.1 Electronic Tone or Signal

            4.1.10.2.3.2.2.2 Recorded Signal Direction

        4.1.10.2.3.2.3 Indicator Light (trans-illuminated)

            4.1.10.2.3.2.3.1 Lighted Pushbutton Display

            4.1.10.2.3.2.3.2 Multiple-Status Illuminated Pushbutton

            4.1.10.2.3.2.3.3 Single-Status Illuminated Pushbutton

        4.1.10.2.3.2.4 Light-Emitting Diode (LED)

        4.1.10.2.3.2.5 Liquid-Crystal Display (LCD)

- 4.1.10.2.3.2.6 Mechanical Display (non-pointer gauge)
- 4.1.10.2.3.2.7 Projection Device
- 4.1.10.2.3.2.8 Random-Access Digital Readout
  - 4.1.10.2.3.2.8.1 Back-Lighted Belt Display
  - 4.1.10.2.3.2.8.2 Cold-Cathode Tube (e.g., vacuum fluorescent)
  - 4.1.10.2.3.2.8.3 Edge-Lighted Plate
  - 4.1.10.2.3.2.8.4 LED Display
  - 4.1.10.2.3.2.8.5 Liquid-Crystal Readout (LCR)
  - 4.1.10.2.3.2.8.6 Projection Readout
- 4.1.10.2.3.2.9 Mechanical Scalar Display
  - 4.1.10.2.3.2.9.1 Fixed-Pointer, Moving-Scale Display
  - 4.1.10.2.3.2.9.2 Moving-Pointer, Fixed-Scale Display
- 4.1.10.2.3.2.10 Sequential-Access Digital Readout
  - 4.1.10.2.3.2.10.1 Electromechanical Drum Counter
  - 4.1.10.2.3.2.10.2 Flag Counter
- 4.1.10.2.3.2.11 Status Display
  - 4.1.10.2.3.2.11.1 Large-Screen Display
  - 4.1.10.2.3.2.11.2 Map Display
  - 4.1.10.2.3.2.11.3 Matrix Board
  - 4.1.10.2.3.2.11.4 Plot Board
  - 4.1.10.2.3.2.11.5 Projected Display
- 4.1.10.2.3.2.12 Hard-Copy Readout Device
  - 4.1.10.2.3.2.12.1 Plotter
  - 4.1.10.2.3.2.12.2 Printer
  - 4.1.10.2.3.2.12.3 Recorder
- 4.1.10.2.3.3 Attributes of Display
  - 4.1.10.2.3.3.1 Display Size
    - 4.1.10.2.3.3.1.1 Display Diameter [centimeters]
    - 4.1.10.2.3.3.1.2 Display Height [centimeters]
    - 4.1.10.2.3.3.1.3 Display Width [centimeters]
    - 4.1.10.2.3.3.1.4 Effective Display Surface Dimensions
    - 4.1.10.2.3.3.1.5 Number of Screens

4.1.10.2.3.3.2 Display Viewing Condition

- 4.1.10.2.3.3.2.1 Collimation of Display
- 4.1.10.2.3.3.2.2 Distance of Display from Operator [centimeters]
- 4.1.10.2.3.3.2.3 Magnification of Display
- 4.1.10.2.3.3.2.4 Display Ocular Design
  - 4.1.10.2.3.3.2.4.1 Binocular Display
  - 4.1.10.2.3.3.2.4.2 Dichroic Display
  - 4.1.10.2.3.3.2.4.3 Monocular Left-Eye Display
  - 4.1.10.2.3.3.2.4.4 Monocular Right-Eye Display
- 4.1.10.2.3.3.2.5 Display Resolution
- 4.1.10.2.3.3.2.6 Display Visual Angle or Field of View [degrees]
  - 4.1.10.2.3.3.2.6.1 Parallax
- 4.1.10.2.3.3.2.7 Display Color
  - 4.1.10.2.3.3.2.7.1 Timing
    - 4.1.10.2.3.3.2.7.1.1 Quicken Color Display
    - 4.1.10.2.3.3.2.7.1.2 Real Time Color Display
    - 4.1.10.2.3.3.2.7.1.3 Slowing Color Display
  - 4.1.10.2.3.3.2.7.2 Flicker
- 4.1.10.2.3.3.2.8 Display Media Characteristics
  - 4.1.10.2.3.3.2.8.1 Hues or Wavelengths
  - 4.1.10.2.3.3.2.8.2 Luminance Rise Time
  - 4.1.10.2.3.3.2.8.3 Luminance Buildup
  - 4.1.10.2.3.3.2.8.4 Emission Characteristics
- 4.1.10.2.3.3.2.9 Display Fresh Rate
  - 4.1.10.2.3.3.2.9.1 Information Update Rate
  - 4.1.10.2.3.3.2.9.2 Interlacing Characteristics
  - 4.1.10.2.3.3.2.9.3 Color Saturation
  - 4.1.10.2.3.3.2.9.4 Distortion
  - 4.1.10.2.3.3.2.9.5 Granularity
  - 4.1.10.2.3.3.2.9.6 Acutance
  - 4.1.10.2.3.3.2.9.7 Duration
  - 4.1.10.2.3.3.2.9.8 After Images

- 4.1.10.2.3.3.2.10    Readability Enhancements
  - 4.1.10.2.3.3.2.10.1    Glare Screens
  - 4.1.10.2.3.3.2.10.2    Glare Shields
  - 4.1.10.2.3.3.2.10.3    Light Absorbing Material
    - 4.1.10.2.3.3.2.10.3.1    Dichroic Filters
    - 4.1.10.2.3.3.2.10.3.2    Optical Coatings
    - 4.1.10.2.3.3.2.10.3.3    Wavelength Filters
- 4.1.10.2.3.3.2.11    Display Accuracy
  - 4.1.10.2.3.3.2.11.1    Marking Accuracy
  - 4.1.10.2.3.3.2.11.2    Interpolation Accuracy
  - 4.1.10.2.3.3.2.11.3    Scale Linearity
  - 4.1.10.2.3.3.2.11.4    Numbering Scheme
  - 4.1.10.2.3.3.2.11.5    Scale-to-Redline Distance
  - 4.1.10.2.3.3.2.11.6    Scale Factor
  - 4.1.10.2.3.3.2.11.7    Number of Graduation Marks
- 4.1.10.2.3.3.2.12    Implementation Strategy
  - 4.1.10.2.3.3.2.12.1    Assistant
  - 4.1.10.2.3.3.2.12.2    Associate
  - 4.1.10.2.3.3.2.12.3    Autonomous
  - 4.1.10.2.3.3.2.12.4    Memory Jogger
  - 4.1.10.2.3.3.2.12.5    Prompter or Plodder
- 4.1.10.2.3.4    Alphanumeric
  - 4.1.10.2.3.4.1    Font Style
  - 4.1.10.2.3.4.2    Symbol Height
  - 4.1.10.2.3.4.3    Height-to-Width Ratio
  - 4.1.10.2.3.4.4    Stroke Width
  - 4.1.10.2.3.4.5    Spacing
    - 4.1.10.2.3.4.5.1    Nominal Distance
    - 4.1.10.2.3.4.5.2    Equal Spacing
    - 4.1.10.2.3.4.5.3    Proportional Spacing
  - 4.1.10.2.3.4.6    Justification
    - 4.1.10.2.3.4.6.1    Left

- 4.1.10.2.3.4.6.2 Right
- 4.1.10.2.3.4.6.3 Block
- 4.1.10.2.3.4.6.4 Centered
- 4.1.10.2.3.5 Pictorial
  - 4.1.10.2.3.5.1 Dimensional Correspondence
    - 4.1.10.2.3.5.1.1 Equal (one-to-one, e.g., 1D as 1D, 2D as 2D)
    - 4.1.10.2.3.5.1.2 Expanded (e.g., 1D information presented as 2D)
    - 4.1.10.2.3.5.1.3 Condensed (e.g., 2D information presented as 1D)
- 4.1.10.2.3.6 Auditory Displays
  - 4.1.10.2.3.6.1 Signal Type
    - 4.1.10.2.3.6.1.1 Simple Tones
    - 4.1.10.2.3.6.1.2 Complex or Multiple Tones
    - 4.1.10.2.3.6.1.3 Speech
  - 4.1.10.2.3.6.2 Pitch or Frequency(ies)
  - 4.1.10.2.3.6.3 Signal Intensity
  - 4.1.10.2.3.6.4 Signal Repeat Rate
  - 4.1.10.2.3.6.5 Audibility
    - 4.1.10.2.3.6.5.1 Alerting Capability
    - 4.1.10.2.3.6.5.2 Discrimination
    - 4.1.10.2.3.6.5.3 Compatibility
    - 4.1.10.2.3.6.5.4 Masking or Localization Techniques
- 4.1.10.2.3.7 Content
  - 4.1.10.2.3.7.1 Format
    - 4.1.10.2.3.7.1.1 Screen Layout and Structuring
    - 4.1.10.2.3.7.1.2 Highlighting
    - 4.1.10.2.3.7.1.3 Data or Information Presentation
      - 4.1.10.2.3.7.1.3.1 Format Complexity
      - 4.1.10.2.3.7.1.3.2 Data or Information Quantity
      - 4.1.10.2.3.7.1.3.3 Data or Information Relevancy
    - 4.1.10.2.3.7.1.4 Inter-frame Considerations
    - 4.1.10.2.3.7.1.5 Grouping
  - 4.1.10.2.3.7.2 Messages

- 4.1.10.2.3.7.3 Labeling
- 4.1.10.2.3.7.4 Abbreviations
- 4.1.10.2.3.7.5 Scaling
- 4.1.10.2.3.7.6 Coding
  - 4.1.10.2.3.7.6.1 Shape Coding
  - 4.1.10.2.3.7.6.2 Color or Shade Coding
  - 4.1.10.2.3.7.6.3 Display Rate Coding
- 4.1.10.2.3.8 Display Dynamics
  - 4.1.10.2.3.8.1 Prompting and Structuring
  - 4.1.10.2.3.8.2 Timing
    - 4.1.10.2.3.8.2.1 Real Time
    - 4.1.10.2.3.8.2.2 Quickening
    - 4.1.10.2.3.8.2.3 Slowing
  - 4.1.10.2.3.8.3 Response Time
    - 4.1.10.2.3.8.3.1 Initial Response Time
    - 4.1.10.2.3.8.3.2 Update Rate
- 4.1.10.2.3.9 Legibility
  - 4.1.10.2.3.9.1 Contrast
    - 4.1.10.2.3.9.1.1 Object Color Contrast or Extent
      - 4.1.10.2.3.9.1.1.1 Hue
      - 4.1.10.2.3.9.1.1.2 Saturation
      - 4.1.10.2.3.9.1.1.3 Brightness
    - 4.1.10.2.3.9.1.2 Background Color Contrast or Extent
      - 4.1.10.2.3.9.1.2.1 Hue
      - 4.1.10.2.3.9.1.2.2 Saturation
      - 4.1.10.2.3.9.1.2.3 Brightness
  - 4.1.10.2.3.9.2 Point Spread or Blurring
  - 4.1.10.2.3.9.3 Symbol Resolution
  - 4.1.10.2.3.9.4 Symbol Spacing
  - 4.1.10.2.3.9.5 Display Filter Characteristics
    - 4.1.10.2.3.9.5.1 Polarization
    - 4.1.10.2.3.9.5.2 Reflectivity or Glare

4.1.10.2.3.10 Clutter

4.1.10.2.3.11 Display Size

    4.1.10.2.3.11.1 Physical Dimensions

    4.1.10.2.3.11.2 Effective Display Surface

    4.1.10.2.3.11.3 Number of Screens or Windows

    4.1.10.2.3.11.4 Scene Magnification Factor

4.1.10.2.3.12 Fatigue Inducements

    4.1.10.2.3.12.1 Flicker

    4.1.10.2.3.12.2 Radiant Energy

    4.1.10.2.3.12.3 Luminance Rise Time

    4.1.10.2.3.12.4 Luminance Decay Time

    4.1.10.2.3.12.5 Luminance Buildup

    4.1.10.2.3.12.6 Display Update Rate

    4.1.10.2.3.12.7 Interlacing

    4.1.10.2.3.12.8 Color Saturation

    4.1.10.2.3.12.9 Distortion

    4.1.10.2.3.12.10 Viewing Distance

    4.1.10.2.3.12.11 Viewing Duration

4.1.10.2.3.13 Information

    4.1.10.2.3.13.1 Scales

        4.1.10.2.3.13.1.1 Linear

        4.1.10.2.3.13.1.2 Logarithmic or Exponential

    4.1.10.2.3.13.2 Parallax

    4.1.10.2.3.13.3 Markings Accuracy

    4.1.10.2.3.13.4 Interpolation or Extrapolation Accuracy

    4.1.10.2.3.13.5 Numbering Scheme

    4.1.10.2.3.13.6 Scale-to-Redline Distance

        4.1.10.2.3.13.6.1 Scale Factor

        4.1.10.2.3.13.6.2 Number of Graduation Marks

4.1.10.2.3.14 Color or Shade Specification

    4.1.10.2.3.14.1 Actual

        4.1.10.2.3.14.1.1 Initial (new)

- 4.1.10.2.3.14.1.2 Degradation over Time
  - 4.1.10.2.3.14.2 Subjective
    - 4.1.10.2.3.14.2.1 User Name
    - 4.1.10.2.3.14.2.2 Purkinje Shift
    - 4.1.10.2.3.14.2.3 Chromatic Adaptation
  - 4.1.10.2.4 Control or Display Interaction
    - 4.1.10.2.4.1 Control Implementation Strategies
      - 4.1.10.2.4.1.1 Manual Controls (crew initiation, no system modification)
      - 4.1.10.2.4.1.2 Dual/Blended Input Controls (crew initiated, system modified, fly-by-wire FCS)
      - 4.1.10.2.4.1.3 By Consent Controls (system initiated, crew consent required to execute)
      - 4.1.10.2.4.1.4 Override Required Controls (system initiated, crew override optional to execute)
      - 4.1.10.2.4.1.5 Management-by-Exception Controls (system autonomous, crew override)
    - 4.1.10.2.4.1.6 Backup or Secondary Controls
  - 4.1.10.2.4.2 Display Implementation Strategies
    - 4.1.10.2.4.2.1 Memory Jogger Display (data only)
    - 4.1.10.2.4.2.2 Promoter or Prodger Display (prompt crew)
    - 4.1.10.2.4.2.3 Assistance Display (format tailored by crew)
    - 4.1.10.2.4.2.4 Associate Display (format tailored by system)
  - 4.1.10.2.4.3 Control or Display Relationships
    - 4.1.10.2.4.3.1 Control Movement or Display Movement
    - 4.1.10.2.4.3.2 Control Position or Display Position
    - 4.1.10.2.4.3.3 Control Input or Display Output Delay
  - 4.1.10.3 Passenger or Cargo Stations (JTCG)
    - 4.1.10.3.1 same categories as 4.1.10.2
  - 4.1.10.4 Aero-medical Evacuation (DH2-2)
- ## 4.2 Weapon
- 4.2.1 Type of Weapon
    - 4.2.1.1 Small-Caliber Gun
    - 4.2.1.2 Large-Caliber Gun
    - 4.2.1.3 Missiles and Rockets

- 4.2.1.4 Bombs
- 4.2.1.5 Torpedoes
- 4.2.2 Attributes of Weapon
  - 4.2.2.1 Fire Power (payload)
  - 4.2.2.2 Firing Characteristics
    - 4.2.2.2.1 Rate
    - 4.2.2.2.2 Reload Capability
    - 4.2.2.2.3 Visual Indication
      - 4.2.2.2.3.1 Flame
      - 4.2.2.2.3.2 Flash
  - 4.2.2.3 Guidance
    - 4.2.2.3.1 Accuracy
    - 4.2.2.3.2 Backup Guidance Modes
  - 4.2.2.4 Lethality
    - 4.2.2.4.1 Aspect or Range Limitations
      - 4.2.2.4.1.1 Launcher Limitations
      - 4.2.2.4.1.2 Terrain Masking
      - 4.2.2.4.1.3 Threat Force Distribution
      - 4.2.2.4.1.4 Tracking Accuracy
    - 4.2.2.4.2 Range
    - 4.2.2.4.3 Tracking Algorithms
    - 4.2.2.4.4 Tracking Rate
  - 4.2.2.5 Maintenance Downtime
  - 4.2.2.6 Re-supply Time
  - 4.2.2.7 Tracking Mechanism
    - 4.2.2.7.1 Type of Tracking Mechanism
      - 4.2.2.7.1.1 Electro-optical
      - 4.2.2.7.1.2 Infrared
      - 4.2.2.7.1.3 Radar
    - 4.2.2.7.2 Attributes of Tracking Mechanism
  - 4.2.2.8 Weapon and Vehicle Interaction
- 4.3 Computer

4.3.1 Processing Capability

4.3.2 Portability

4.3.3 Operating Limits

4.3.4 Software

4.3.4.1 Software Usability

4.3.4.1.1 Aspects Affecting Adaptation of System

4.3.4.1.1.1 Common User Errors

4.3.4.1.1.2 User Characteristics

4.3.4.1.1.3 User Performance

4.3.4.1.1.4 User Goals

4.3.4.1.1.5 Environment

4.3.4.1.2 Methods of Adaptation Onset

4.3.4.1.2.1 On-Request Onset

4.3.4.1.2.2 Prompted Onset

4.3.4.1.2.3 Automatic Onset

4.3.5 Human-Computer Interface

4.3.5.1 Actions

4.3.5.1.1 Computation

4.3.5.1.2 Storage

4.3.5.1.3 Retrieval

4.3.5.1.4 Operation of Peripheral Devices

4.3.5.2 Behaviors

4.3.5.2.1 User Navigation

4.3.5.2.1.1 Selection from Map or Display

4.3.5.2.1.2 Move to More General Command or Concept

4.3.5.2.1.3 Move to More Detailed Command or Concept

4.3.5.2.1.4 Move to Associated Concept or Command

4.3.5.2.1.5 Switch Between Modes, Windows, or Environments

4.3.5.2.1.6 Ask for Help

4.3.5.2.1.7 Move Through a Sequence of Commands or Information

4.3.5.2.2 Interaction Styles

4.3.5.2.2.1 Direct Manipulation

- 4.3.5.2.2.1.1 Icons
- 4.3.5.2.2.1.2 Engagement
- 4.3.5.2.2.1.3 Stimulus-Response Compatibility
- 4.3.5.2.2.2 Command Driven
  - 4.3.5.2.2.2.1 Command Languages
    - 4.3.5.2.2.2.1.1 Command Syntax
    - 4.3.5.2.2.2.1.2 Language Semantics and Expressiveness
    - 4.3.5.2.2.2.1.3 Shortcuts and Macros
  - 4.3.5.2.2.2.2 Command Menus
  - 4.3.5.2.2.3 Form Filling
    - 4.3.5.2.2.3.1 Query By Example
  - 4.3.5.2.2.4 Menus
    - 4.3.5.2.2.4.1 Menu Design
    - 4.3.5.2.2.4.2 Menu Maps
    - 4.3.5.2.2.4.3 Menu Selection
  - 4.3.5.2.2.5 Conversational
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- 4.3.5.2.3 Input Devices
  - 4.3.5.2.3.1 Data Entry
    - 4.3.5.2.3.1.1 Keyboard
    - 4.3.5.2.3.1.2 Function Keys
    - 4.3.5.2.3.1.3 Bar Codes
    - 4.3.5.2.3.1.4 Digitizing Tablet
  - 4.3.5.2.3.2 Pointing Devices
    - 4.3.5.2.3.2.1 Direct Pointing
      - 4.3.5.2.3.2.1.1 Lightpen
      - 4.3.5.2.3.2.1.2 Touch Screen
    - 4.3.5.2.3.2.2 Indirect Pointing
      - 4.3.5.2.3.2.2.1 Mouse
      - 4.3.5.2.3.2.2.2 Trackball
      - 4.3.5.2.3.2.2.3 Joystick
      - 4.3.5.2.3.2.2.4 Graphics Tablet

4.3.5.2.3.2.3 Speech Recognition

4.3.5.3 Contexts

4.3.5.3.1 Task Complexity

4.3.5.3.2 Temporal Constraints

4.3.5.3.3 System Malfunctions, Limitations, and Capabilities

4.3.5.3.4 Knowledge of Results

4.3.5.4 Displays

4.3.5.4.1 Multimedia

4.3.5.4.1.1 Auditory Displays

4.3.5.4.1.2 Video

4.3.5.4.1.3 2-D Graphics

4.3.5.4.1.4 3-D Graphics

4.3.5.4.1.5 Text Display

4.3.5.4.2 Screen Design

4.3.5.4.2.1 Screen Complexity

4.3.5.4.2.2 Window Design

4.3.5.4.3 Display Composition

4.3.5.4.3.1 Prioritization of Displayable Information

4.3.5.4.3.2 Sequencing and Positioning of Information Sources

4.3.5.4.3.3 Orientation of Attention to Displays

4.3.5.4.4 Sensory Coding of Information and Visual Cues

4.3.5.4.4.1 Icons

4.3.5.4.4.2 Icon Design

4.3.5.4.4.3 Icon Libraries

4.3.5.4.4.4 Moving Icons (Micons)

4.3.5.4.5 Earcons

4.3.5.5 Effects

4.3.5.5.1 Response Time

4.3.5.5.2 Errors

4.3.5.5.2.1 Error Messages

4.3.5.5.2.2 Error Prevention

4.3.5.6 Forms

- 4.3.5.6.1 Non-Spatial Metaphors
  - 4.3.5.6.1.1 Books
  - 4.3.5.6.1.2 Cards
  - 4.3.5.6.1.3 Files
  - 4.3.5.6.1.4 People and Situations
  - 4.3.5.6.1.5 Desktops
- 4.3.5.6.2 Spatial Models
  - 4.3.5.6.2.1 Maps
  - 4.3.5.6.2.2 Rooms
  - 4.3.5.6.2.3 Freeways
  - 4.3.5.6.2.4 Three-Dimensional Spaces
- 4.3.5.6.3 Visualizing Information
  - 4.3.5.6.3.1 Automatic Icons
  - 4.3.5.6.3.2 Simulations and Artificial Realities
- 4.3.5.7 Goals
  - 4.3.5.7.1 Normative Task Analysis
  - 4.3.5.7.2 Descriptive Goal Identification
    - 4.3.5.7.2.1 Verbal Protocol Analysis
    - 4.3.5.7.2.2 Interviewing
    - 4.3.5.7.2.3 Error and Critical Incident Analysis
    - 4.3.5.7.2.4 Response Time Studies
- 4.3.6 Information Transfer Capabilities
  - 4.3.6.1 Direct Connection
  - 4.3.6.2 Modem Connection
    - 4.3.6.2.1 Dial-up
    - 4.3.6.2.2 Broad Band
  - 4.3.6.3 Satellite
  - 4.3.6.4 Radio
- 4.4 Farm
- 4.5 Factory
- 4.6 Hospital
- 4.7 Household

4.8 Office

4.9 Attributes

    4.9.1 Mobility

    4.9.2 Range

    4.9.3 Payload

    4.9.4 Support Requirements

    4.9.5 Damage Suppression

        4.9.5.1 Vulnerability (Mil-Std-2069)

            4.9.5.1.1 Signature

                4.9.5.1.1.1 Aural or Acoustic

                4.9.5.1.1.2 Infrared

                4.9.5.1.1.3 Radar

                4.9.5.1.1.4 Electro-optical

                4.9.5.1.1.5 Visual

        4.9.5.2 Survivability (Mil-Std-2069)

        4.9.5.3 Failure Modes

4.9.6 Maintenance Requirements

4.9.7 Operability Requirements

    4.9.7.1 Operator Training Level

4.10 Stimulus

    4.10.1 Type of Stimulus

        4.10.1.1 Auditory Stimulus

            4.10.1.1.1 Complex Sounds (Not Speech)

            4.10.1.1.2 Speech

                4.10.1.1.2.1 Spoken Words, Including Inflection

            4.10.1.1.3 Tones

        4.10.1.2 Kinesthetic Stimulus

        4.10.1.3 Visual Stimulus

            4.10.1.3.1 Alphanumeric Presentation

            4.10.1.3.2 Graph

            4.10.1.3.3 Gestures and Hand Signals

            4.10.1.3.4 Pictorial Stimulus

- 4.10.1.3.4.1 Dimensional Condensation
  - 4.10.1.3.4.2 Dimensional Expansion
  - 4.10.1.3.4.3 One-to-One Dimensional Correspondence
    - 4.10.1.3.4.3.1 Holography
    - 4.10.1.3.4.3.2 Stereoscopy
  - 4.10.1.4 Tactile Stimulus
- 4.10.2 Attributes of Stimulus
- 4.10.2.1 Background of Stimulus
    - 4.10.2.1.1 Complexity of Stimulus
    - 4.10.2.1.2 Contrast of Stimulus
      - 4.10.2.1.2.1 Color Contrast
        - 4.10.2.1.2.1.1 Perceived Symbol Hue
        - 4.10.2.1.2.1.2 Perceived Background Hue
        - 4.10.2.1.2.1.3 Perceived Symbol Saturation
        - 4.10.2.1.2.1.4 Perceived Symbol Brightness
        - 4.10.2.1.2.1.5 Perceived Background Brightness
      - 4.10.2.1.2.2 Simultaneous Contrast
      - 4.10.2.1.2.3 Point Spread Function or Blurring
      - 4.10.2.1.2.4 Symbol Resolution
      - 4.10.2.1.2.5 Symbol Spacing
      - 4.10.2.1.2.6 Display Filtering Characteristics
    - 4.10.2.1.3 Clutter
      - 4.10.2.1.3.1 Identification
      - 4.10.2.1.3.2 Reduction

4.10.2.2 Characteristics of Stimulus

    - 4.10.2.2.1 Alphanumeric Presentation
      - 4.10.2.2.1.1 Font Style
      - 4.10.2.2.1.2 Height-to-Width Ratio
      - 4.10.2.2.1.3 Justification
        - 4.10.2.2.1.3.1 Block Justified
        - 4.10.2.2.1.3.2 Centered
        - 4.10.2.2.1.3.3 Left Justified

- 4.10.2.2.1.3.4 Right Justified
- 4.10.2.2.1.4 Spacing
  - 4.10.2.2.1.5.1 Equal Spacing
  - 4.10.2.2.1.5.2 Nominal Distance
  - 4.10.2.2.1.5.3 Proportional Spacing
- 4.10.2.2.1.5 Stroke Width
- 4.10.2.2.2 Changing or Moving Stimulus
- 4.10.2.2.3 Coded Stimulus
  - 4.10.2.2.3.1 Shape
- 4.10.2.2.4 Conspicuity of Stimulus
- 4.10.2.2.5 Raw Stimulus
- 4.10.2.2.6 Relevancy
- 4.10.2.2.7 Static Stimulus
- 4.10.2.2.8 Color of Stimulus
- 4.10.2.2.9 Size or Amplitude of Stimulus
- 4.10.2.3 Duration of Stimulus [minutes]
  - 4.10.2.3.1 Continuous Event
  - 4.10.2.3.2 Intermittent Event
    - 4.10.2.3.2.1 Probability of Occurrence of Event [percent]
    - 4.10.2.3.2.2 Probability of Occurrence of Event [percent]
  - 4.10.2.3.3 Single Occurrence of Event [time of day]
- 4.10.2.4 Information Presented by Stimulus
  - 4.10.2.4.1 Content of Stimulus
  - 4.10.2.4.2 Qualitative Description of Stimulus
  - 4.10.2.4.3 Quantitative Description of Stimulus
    - 4.10.2.4.3.1 Order (Sequence)
    - 4.10.2.4.3.2 Timing
  - 4.10.2.4.4 Directly Viewed Event
  - 4.10.2.4.5 Displayed Material
  - 4.10.2.4.6 Written Material
  - 4.10.2.4.7 Stacking
    - 4.10.2.4.7.1 On-line Interaction

- 4.10.2.4.7.2 Stack Access
- 4.10.2.4.7.3 Stack Information Content
- 4.10.2.4.7.4 Stack Level
- 4.10.2.5 Location of Stimulus on Display
  - 4.10.2.5.1 Center Position
  - 4.10.2.5.2 Lower-Left Position
  - 4.10.2.5.3 Lower-Middle Position
  - 4.10.2.5.4 Lower-Right Position
  - 4.10.2.5.5 Middle-Left Position
  - 4.10.2.5.6 Middle-Right Position
  - 4.10.2.5.7 Upper-Left Position
  - 4.10.2.5.8 Upper-Middle Position
  - 4.10.2.5.9 Upper-Right Position
  - 4.10.2.5.10 Predictability of Location
- 4.10.2.6 Number of Stimuli
  - 4.10.2.6.1 Multiple Stimuli
  - 4.10.2.6.2 Single Stimulus
- 4.10.2.7 Range of Values of Stimulus
- 4.10.2.8 Relative Movement of Stimulus
  - 4.10.2.8.1 Observer and Target at Rest
  - 4.10.2.8.2 Observer and Target in Motion
  - 4.10.2.8.3 Observer in Motion, Target at Rest
  - 4.10.2.8.4 Observer at Rest, Target in Motion
- 4.10.2.9 Position of Observer Relative to Stimulus
  - 4.10.2.9.1 Horizontal Range of Stimulus [kilometers]
  - 4.10.2.9.2 Offset Distance of Stimulus [kilometers]
  - 4.10.2.9.3 Position of Stimulus
    - 4.10.2.9.3.1 Air-to-Air Combat
    - 4.10.2.9.3.2 Air-to-Ground Combat
    - 4.10.2.9.3.3 At a Display
    - 4.10.2.9.3.4 Ground-to-Air Combat
    - 4.10.2.9.3.5 Ground-to-Ground Combat

- 4.10.2.10 Size or Amplitude of Stimulus
- 4.10.2.11 Discrimination Ability for Stimulus
- 4.11 System Characteristics
  - 4.11.1 General System Variables
    - 4.11.1.1 Requirements and Constraints Imposed on System
    - 4.11.1.2 Resources Required by System
    - 4.11.1.3 Nature of System's Internal Processes
    - 4.11.1.4 Nature, Number, and Specificity of System Goals
    - 4.11.1.5 Structural and Organizational Characteristics of System
      - 4.11.1.5.1 Size of System
      - 4.11.1.5.2 Number of Subsystems and Units
      - 4.11.1.5.3 Communication Channels
      - 4.11.1.5.4 Hierarchical Levels
      - 4.11.1.5.5 Amount of Feedback
    - 4.11.1.6 Degree of System Automation and Interactive Computerization
    - 4.11.1.7 Nature of Environment in Which System Functions
    - 4.11.1.8 System Attributes
      - 4.11.1.8.1 Complexity of System
      - 4.11.1.8.2 Determinacy of System
      - 4.11.1.8.3 Flexibility of System
      - 4.11.1.8.4 Reliability of System
      - 4.11.1.8.5 Sensitivity of System
      - 4.11.1.8.6 Vulnerability of System
    - 4.11.1.9 Number and Type of System Interdependencies
    - 4.11.1.10 Nature of System's Terminal Output(s)
  - 4.11.2 General Behavioral Variables
    - 4.11.2.1 Number of Personnel Involved and How Arranged
      - 4.11.2.1.1 Individuals
      - 4.11.2.1.2 Team
    - 4.11.2.2 Personnel Aptitude for Tasks Performed
    - 4.11.2.3 Amount and Appropriateness of Training
    - 4.11.2.4 Amount of Personnel Experience/Skills

- 4.11.2.5 Number and Type of Interdependencies Within Team
- 4.11.2.6 Motivational Variables
  - 4.11.2.6.1 Reward
  - 4.11.2.6.2 Punishment
- 4.11.2.7 Requirements and Constraints Imposed on Personnel
- 4.11.2.8 Physical Environment for Personnel Performance
- 4.11.2.9 Factors Leading to Performance Deterioration
  - 4.11.2.9.1 Fatigue
  - 4.11.2.9.2 Illness
  - 4.11.2.9.3 Injury
  - 4.11.2.9.4 Stress
- 4.11.3 System Variables in Detail
  - 4.11.3.1 System Type
    - 4.11.3.1.1 Communication System
      - 4.11.3.1.1.1 Radio System (broadcast radio stations and networks)
      - 4.11.3.1.1.2 Television System (broadcast and cable TV stations, head ends, and networks)
      - 4.11.3.1.1.3 Telephone System (switching facilities and networks)
      - 4.11.3.1.1.4 Publishing System (e.g., newspaper)
    - 4.11.3.1.2 Environmental Facility
      - 4.11.3.1.2.1 Park
      - 4.11.3.1.2.2 Beach
    - 4.11.3.1.3 Entertainment Facility
      - 4.11.3.1.3.1 Theatre
      - 4.11.3.1.3.2 Fair
      - 4.11.3.1.3.3 Museum
    - 4.11.3.1.4 Habitation Facility
      - 4.11.3.1.4.1 Hotel, Motel, or Barrack
      - 4.11.3.1.4.2 Office Building
      - 4.11.3.1.4.3 School, College, or University
    - 4.11.3.1.5 Health Provider Facility
      - 4.11.3.1.5.1 Hospital
      - 4.11.3.1.5.2 Clinic or Medical Center

- 4.11.3.1.6 Information Collection/Assessment Facility (e.g., Combat Information Center)
- 4.11.3.1.7 Judicial Facility (e.g., law court)
- 4.11.3.1.8 Legislative Facility (i.e., law making)
- 4.11.3.1.9 Management Organization
  - 4.11.3.1.9.1 Company Directors
  - 4.11.3.1.9.2 Stock Exchange Governors
  - 4.11.3.1.9.3 Brokers
- 4.11.3.1.10 Management Styles
  - 4.11.3.1.10.1 Autocratic
  - 4.11.3.1.10.2 Democratic
  - 4.11.3.1.10.3 Hierarchic
- 4.11.3.1.11 Marketing Organization
  - 4.11.3.1.11.1 Sales Organization
  - 4.11.3.1.11.2 Advertising Organization
- 4.11.3.1.12 Military Organizational Group
  - 4.11.3.1.12.1 Theater Army
  - 4.11.3.1.12.2 Corps
  - 4.11.3.1.12.3 Division
  - 4.11.3.1.12.4 Brigade
  - 4.11.3.1.12.5 Battalion
  - 4.11.3.1.12.6 Company
  - 4.11.3.1.12.7 Platoon
  - 4.11.3.1.12.8 Squad
- 4.11.3.1.13 Production Facility
  - 4.11.3.1.13.1 Factory
  - 4.11.3.1.13.2 Steel Mill
  - 4.11.3.1.13.3 Mining Operation
  - 4.11.3.1.13.4 Fishing Operation (fleets, hatcheries, fish farms)
  - 4.11.3.1.13.5 Farm, Orchard, or Winery
- 4.11.3.1.14 Product Distribution Facility
  - 4.11.3.1.14.1 Supermarket
  - 4.11.3.1.14.2 Department Store

- 4.11.3.1.15 Product Maintenance Facility (e.g., repair shop)
- 4.11.3.1.16 Protection Facility
  - 4.11.3.1.16.1 Police station
  - 4.11.3.1.16.2 Fire House
- 4.11.3.1.17 Support Facility
  - 4.11.3.1.17.1 Warehouse
  - 4.11.3.1.17.2 Word Processing Center
- 4.11.3.1.18 Training Facility
  - 4.11.3.1.18.1 School
  - 4.11.3.1.18.2 University or College
- 4.11.3.1.19 Transportation Facility
  - 4.11.3.1.19.1 Truck or Rail Terminal
  - 4.11.3.1.19.2 Harbor
  - 4.11.3.1.19.3 Airport
- 4.11.3.1.20 Weapon System (e.g., fighter plane)
- 4.11.3.1.21 Welfare Facility
  - 4.11.3.1.21.1 Juvenile Home
  - 4.11.3.1.21.2 Welfare Agency
- 4.11.3.2 System Functions
  - 4.11.3.2.1 Analysis
    - 4.11.3.2.1.1 Commercial Information Processing
    - 4.11.3.2.1.2 Problem Solving
  - 4.11.3.2.2 Combat Information Processing
  - 4.11.3.2.3 Communication
  - 4.11.3.2.4 Computation
    - 4.11.3.2.4.1 Money Handling
    - 4.11.3.2.4.2 Information Handling
  - 4.11.3.2.5 Control (e.g., law enforcement)
  - 4.11.3.2.6 Dispatching
    - 4.11.3.2.6.1 Personnel Dispatching (e.g., police, service)
    - 4.11.3.2.6.2 Object Dispatching (e.g., taxi)
  - 4.11.3.2.7 Entertainment

- 4.11.3.2.7.1 Acting
- 4.11.3.2.7.2 Singing
- 4.11.3.2.7.3 Dancing
- 4.11.3.2.8 Fabrication
  - 4.11.3.2.8.1 Building Construction
  - 4.11.3.2.8.2 Other Construction
- 4.11.3.2.9 Housing
  - 4.11.3.2.9.1 Human Housing
  - 4.11.3.2.9.2 Animal Housing (e.g., stable, barn)
- 4.11.3.2.10 Householding
  - 4.11.3.2.10.1 Food Preparation
  - 4.11.3.2.10.2 Cleaning
- 4.11.3.2.11 Inspection (as in quality control)
- 4.11.3.2.12 Maintenance
  - 4.11.3.2.12.1 Preventive Maintenance
  - 4.11.3.2.12.2 Corrective Maintenance
- 4.11.3.2.13 Management (as in organization)
- 4.11.3.2.14 Processing
  - 4.11.3.2.14.1 Product Processing
  - 4.11.3.2.14.2 Document Processing
  - 4.11.3.2.14.3 Information Processing
- 4.11.3.2.15 Food Processing
  - 4.11.3.2.15.1 Produce Processing
  - 4.11.3.2.15.2 Mineral Processing
  - 4.11.3.2.15.3 Animal Processing
- 4.11.3.2.16 Rescuing (as in fire fighting)
- 4.11.3.2.17 Selling or Distributing (e.g., products)
- 4.11.3.2.18 Service Providing (e.g., secretariat)
- 4.11.3.2.19 Studying
  - 4.11.3.2.19.1 Scientific or Engineering Research
  - 4.11.3.2.19.2 Conduct of Research
- 4.11.3.2.20 Teaching or Training

4.11.3.2.21 Transporting

    4.11.3.2.21.1 Transporting of Humans

    4.11.3.2.21.2 Transporting of Products

4.11.3.3 System Structure

    4.11.3.3.1 System Size

        4.11.3.3.1.1 Large System

        4.11.3.3.1.2 Small System

        4.11.3.3.1.3 Intermediate System

    4.11.3.3.2 Number of Units and Subsystems

    4.11.3.3.3 Number of Personnel in System

    4.11.3.3.4 System Organization

        4.11.3.3.4.1 Vertical Organization

        4.11.3.3.4.2 Lateral Organization

        4.11.3.3.4.3 Centralized Organization

        4.11.3.3.4.4 Decentralized Organization

            4.11.3.3.4.4.1 Communications Channels

                4.11.3.3.4.4.1.1 Number of Communications Channels

                4.11.3.3.4.4.1.2 Type of Communications Channels (internal/external to system)

            4.11.3.3.4.4.2 Organizational Attributes

                4.11.3.3.4.4.2.1 Complexity of Organization

                4.11.3.3.4.4.2.2 Determinacy of Organization

                4.11.3.3.4.4.2.3 Flexibility of Organization

                4.11.3.3.4.4.2.4 Reliability of Organization

                4.11.3.3.4.4.2.5 Sensitivity of Organization

                4.11.3.3.4.4.2.6 Vulnerability of Organization

            4.11.3.3.4.4.3 Method of System Control

                4.11.3.3.4.4.3.1 Autocratic Control

                4.11.3.3.4.4.3.2 Democratic Control

                4.11.3.3.4.4.3.3 Oligarchic Control

            4.11.3.3.4.4.4 Number of System Hierarchical Levels

            4.11.3.3.4.4.5 System Goals

                4.11.3.3.4.4.5.1 Single Goal

- 4.11.3.3.4.4.5.2      Multiple Goals
  - 4.11.3.3.4.4.5.3      Specific Goal(s)
  - 4.11.3.3.4.4.5.4      General Goal(s)
  - 4.11.3.3.4.4.6      Internal Processes of System
    - 4.11.3.3.4.4.6.1      Repetitive Processes
    - 4.11.3.3.4.4.6.2      Non-repetitive Processes
    - 4.11.3.3.4.4.6.3      Fixed or Proceduralized Processes
    - 4.11.3.3.4.4.6.4      Flexible or Non-proceduralized Processes
    - 4.11.3.3.4.4.6.5      Automated Processes
    - 4.11.3.3.4.4.6.6      Semi-automated Processes
    - 4.11.3.3.4.4.6.7      Mostly Manual Processes
    - 4.11.3.3.4.4.6.8      Computerized Processes
  - 4.11.3.3.4.4.7      System Operations
    - 4.11.3.3.4.4.7.1      Continuous Operations
    - 4.11.3.3.4.4.7.2      Intermittent Operations
    - 4.11.3.3.4.4.7.3      Short Operations
    - 4.11.3.3.4.4.7.4      Long Operations
    - 4.11.3.3.4.4.7.5      Operations Performed Prior to Mission
    - 4.11.3.3.4.4.7.6      Operations Performed Subsequent to Mission
    - 4.11.3.3.4.4.7.7      Operations Performed Early in Mission
    - 4.11.3.3.4.4.7.8      Operations Performed Late in Mission
  - 4.11.3.3.4.4.8      Unit or Subsystem Role
    - 4.11.3.3.4.4.8.1      Performance of Primary Mission
    - 4.11.3.3.4.4.8.2      Provision of System Support
  - 4.11.3.3.4.4.9      Unit or Subsystem Boundaries (division of responsibility)
    - 4.11.3.3.4.4.9.1      Well-Defined Boundaries
    - 4.11.3.3.4.4.9.2      Weakly Defined Boundaries
  - 4.11.3.3.4.4.10      Unit/Subsystem Dependency (ability to function regardless of other units or subsystem performance)
    - 4.11.3.3.4.4.10.1      Completely Dependent Unit/Subsystem
    - 4.11.3.3.4.4.10.2      Partially Dependent Unit/Subsystem
    - 4.11.3.3.4.4.10.3      Wholly Independent Unit/Subsystem
- 4.11.3.4      System Outputs

4.11.3.4.1 System Output Type

4.11.3.4.1.1 Fabricated Products

4.11.3.4.1.2 Raw Materials

4.11.3.4.1.2.1 Food

4.11.3.4.1.2.2 Minerals

4.11.3.4.1.3 Repaired Devices

4.11.3.4.1.4 Geographic Movement (as in transportation)

4.11.3.4.1.5 Communications

4.11.3.4.1.5.1 Messages

4.11.3.4.1.5.2 Books

4.11.3.4.1.5.3 Newspapers

4.11.3.4.1.5.4 Entertainment Products

4.11.3.4.1.6 Weapons Delivery Products

4.11.3.4.1.6.1 Bombs

4.11.3.4.1.6.2 Rifle Fire

4.11.3.4.1.7 Decisions

4.11.3.4.1.7.1 Legislation

4.11.3.4.1.7.2 Buying Stocks

4.11.3.4.1.8 Entertainment

4.11.3.4.1.8.1 Music

4.11.3.4.1.8.2 Television

4.11.3.4.1.8.3 Plays

4.11.3.4.1.8.4 Operas, Operettas

4.11.3.4.1.9 Services

4.11.3.4.1.9.1 Selling

4.11.3.4.1.9.2 Word Processing

4.11.3.4.1.9.3 Medical Treatment

4.11.3.4.1.10 Training Outputs (e.g., skills)

4.11.3.4.2 System Output Number

4.11.3.4.2.1 Single Output

4.11.3.4.2.2 Multiple Outputs

4.11.3.4.2.3 Fixed Outputs(s)

4.11.3.4.2.4 Variable Output(s)

4.11.3.4.3 System Output Frequency

4.11.3.4.3.1 Continuous Output

4.11.3.4.3.2 Intermittent Output

4.11.3.4.3.3 Infrequent Output

4.11.3.4.4 System Output Characteristics

4.11.3.4.4.1 Visible Output

4.11.3.4.4.2 Invisible Output

4.11.3.4.4.3 Abstract Output

4.11.3.4.4.4 Concrete Output

4.11.3.4.5 System Output Source

4.11.3.4.5.1 Equipment

4.11.3.4.5.2 Personnel

4.11.3.4.5.3 Equipment and Personnel Interactively

4.11.3.4.5.4 Equipment and Personnel Non-interactively

4.11.3.4.6 System Output Effects

4.11.3.4.6.1 Change in Other Systems and/or Environment

4.11.3.4.6.2 Change in Own System

4.11.3.4.6.3 Increase or Decrease in Inventory of Objects

4.11.3.4.6.4 Increase or Decrease in Inventory of Personnel (as in combat)

4.11.3.4.6.5 Change in Personnel Condition (as in training)

4.11.3.4.6.6 Change in Function (e.g., repair of equipment)

4.11.3.4.6.7 User Response (e.g., pleasure)

4.11.3.4.6.8 Change in Information Availability

4.11.3.4.6.9 Effect on Output Unknown

4.11.3.5 System Environment

4.11.3.5.1 Type of System Environment

4.11.3.5.1.1 Physical Environment

4.11.3.5.1.1.1 Air

4.11.3.5.1.1.2 Water

4.11.3.5.1.1.3 Temperature

4.11.3.5.1.1.4 Noise

4.11.3.5.1.2 Psychological Environment (e.g., degree of cooperation in team)

4.11.3.5.2 Physical Locus of Environment

4.11.3.5.2.1 Locus Within Own System (e.g., space available)

4.11.3.5.2.2 Locus Outside Own System

4.11.3.5.2.2.1 Locus in Air

4.11.3.5.2.2.2 Locus in Climate

4.11.3.5.2.2.3 Locus in Ocean

4.11.3.5.3 Personnel Perception of Environment

4.11.3.5.3.1 Number of Other Systems in Environment

4.11.3.5.3.2 Environment Threatening or Non-threatening

4.11.3.5.3.3 Environmental Stability

4.11.3.5.3.3.1 Environment Changing Rapidly

4.11.3.5.3.3.2 Environment Changing Slowly

4.11.3.5.4 Environmental Effect Consequences

4.11.3.5.4.1 Effect Known Well, Known Slightly, Unknown

4.11.3.5.4.2 No or Almost No Effect

4.11.3.5.4.3 Slight to Moderate Effect

4.11.3.5.4.4 Great Effect

4.11.3.6 System Inputs

4.11.3.6.1 Type of Input

4.11.3.6.1.1 Physical Input

4.11.3.6.1.1.1 Written Message

4.11.3.6.1.1.2 Illuminated Display

4.11.3.6.1.2 Behavioral Input (e.g., direct verbal order)

4.11.3.6.1.3 Combined Physical/Behavioral Input (e.g., verbal message over facsimile machine)

4.11.3.6.2 Frequency of Input

4.11.3.6.2.1 Continuous Input

4.11.3.6.2.2 Intermittent or Variable Input

4.11.3.6.2.3 One-Time Input (nonrecurring)

4.11.3.6.3 Input Characteristics

4.11.3.6.3.1 Repetitive Input

4.11.3.6.3.2 Non-repetitive Input

- 4.11.3.6.3.3 Formal Regular Input (e.g., alphanumeric clear text)
- 4.11.3.6.3.4 Informal Irregular Input (e.g., radar pattern)
- 4.11.3.6.3.5 Input Meaning Unequivocal (requiring no analysis)
- 4.11.3.6.3.6 Input Ambiguous (requiring analysis and interpretation)
- 4.11.3.6.3.7 Strong Input
- 4.11.3.6.3.8 Weak Input (only slightly above threshold)

#### 4.11.3.6.4 Source of Input

- 4.11.3.6.4.1 Multiple Sources of Input (requiring coordination)
- 4.11.3.6.4.2 Single Source of Input
- 4.11.3.6.4.3 Input Within Own System (as in command from bridge)
- 4.11.3.6.4.4 Input Within Another System (e.g., message from base)
- 4.11.3.6.4.5 Input From Environment (e.g., clouds indicating approaching storm)

### 4.11.3.7 System Communication

#### 4.11.3.7.1 Communication Type

- 4.11.3.7.1.1 Communication Provides Information
- 4.11.3.7.1.2 Communication Requests Information or Direction
- 4.11.3.7.1.3 Communication Commands
- 4.11.3.7.1.4 Communication Asks Question
- 4.11.3.7.1.5 Communication Coordinates Team Activity

#### 4.11.3.7.2 Communication Frequency

- 4.11.3.7.2.1 Continuous Communication
- 4.11.3.7.2.2 Variably Frequent Communication
- 4.11.3.7.2.3 Variably Infrequent Communication

#### 4.11.3.7.3 Source or Direction of Communication

- 4.11.3.7.3.1 Communication Within Own System (any level)
- 4.11.3.7.3.2 Communication to or from Another System
- 4.11.3.7.3.3 Communication Up the Hierarchy
- 4.11.3.7.3.4 Communication Down the Hierarchy
- 4.11.3.7.3.5 Lateral Communication (one unit to another on the same level)

### 4.11.3.8 System Feedback

#### 4.11.3.8.1 Feedback Type

- 4.11.3.8.1.1 Oral Feedback

4.11.3.8.1.2 Visual Feedback

4.11.3.8.1.3 Written Feedback

4.11.3.8.2 Feedback Reference (concerns performance by or relative to)

4.11.3.8.2.1 Individual Reference

4.11.3.8.2.2 Team Reference

4.11.3.8.2.3 Subsystem Reference

4.11.3.8.2.4 Unit Reference

4.11.3.8.2.5 Own System Reference

4.11.3.8.2.6 Other System Reference

4.11.3.8.2.7 Physical Environment

4.11.3.8.2.8 Perceived External Environment

4.11.3.8.3 Feedback Attributes

4.11.3.8.3.1 Specific Feedback

4.11.3.8.3.2 General Feedback

4.11.3.8.3.3 Rewarding Feedback

4.11.3.8.3.4 Neutral Feedback (Information only)

4.11.3.8.3.5 Negative Feedback

4.11.3.8.3.6 Delayed Feedback

4.11.3.8.4 Feedback Frequency

4.11.3.8.4.1 Continuous Feedback

4.11.3.8.4.2 Intermittent Feedback

4.11.3.8.4.3 Very Infrequent Feedback

## 4.12 System Response

4.12.1 Number of Output Units

4.12.2 Duration for Which an Output Must Be Maintained

4.12.3 Number of Elements per Output Unit

4.12.4 Workload

4.12.5 Difficulty of Goal Attainment

4.12.6 Precision of Responses

4.12.7 Response Rate

4.12.8 Simultaneity of Responses

4.12.9 Degree of Muscular Effort Involved

- 4.12.10 Number of Procedural Steps
- 4.12.11 Dependency of Procedural Steps
- 4.12.12 Adherence to Procedures
- 4.12.13 Procedural Complexity
- 4.12.14 Variability of Stimulus Location
- 4.12.15 Stimulus or Stimulus-Complex Duration
- 4.12.16 Regularity of Stimulus Occurrence
- 4.12.17 Operator Control of Stimulus
- 4.12.18 Operator Control of Response
- 4.12.19 Reaction-Time or Feedback-Lag Relationship
- 4.12.20 Feedback
- 4.12.21 Decision Making
- 4.12.22 End-User Involvement During System Design
- 4.12.23 Measure of Performance
  - 4.12.23.1 Response Time
  - 4.12.23.2 Response Accuracy
- 4.13 System Failure Modes
  - 4.13.1 Assumptions
  - 4.13.2 Boundary Conditions
  - 4.13.3 Ground Rules
  - 4.13.4 Recovery Procedures
  - 4.13.5 Severity Classification
    - 4.13.5.1 Error Management
    - 4.13.5.2 Input Sequences
    - 4.13.5.3 System Configuration
    - 4.13.5.4 User Adjusted Values
    - 4.13.5.5 User Input
    - 4.13.5.6 Team Error
      - 4.13.5.6.1 Failure to Detect
      - 4.13.5.6.2 Failure to Indicate
      - 4.13.5.6.3 Failure to Correct

## 5 Equipment

## 5.1 Personal Systems or Life Support (DH2-8)

### 5.1.1 Oxygen Systems

#### 5.1.1.1 Primary (DH2-8)

#### 5.1.1.2 Emergency (DH2-8)

#### 5.1.1.3 Portable (DH2-8)

### 5.1.2 Environmental Control (JTCG)

#### 5.1.2.1 Air Conditioning (DH2-8)

#### 5.1.2.2 Pressurization (DH2-8)

#### 5.1.2.3 Anti-gravity (DH2-8)

### 5.1.3 Accommodation (DH2-8)

#### 5.1.3.1 Ejection Seat Cushions/Coverings (DH2-8)

#### 5.1.3.2 Non-ejection Seat Cushions/Coverings (DH2-8)

#### 5.1.3.3 Restraint (DH2-8)

#### 5.1.3.4 Rest Facilities (DH2-8)

#### 5.1.3.5 Communication Services (DH2-8)

#### 5.1.3.6 Physical Characteristics

##### 5.1.3.6.1 Functional Reach

###### 5.1.3.6.1.1 Reach Zone 1

###### 5.1.3.6.1.2 Reach Zone 2

###### 5.1.3.6.1.3 Reach Zone 3

###### 5.1.3.6.1.4 Fingertip Reach

###### 5.1.3.6.1.5 Grip Reach

###### 5.1.3.6.1.6 Leg Reach

### 5.1.4 Visual Fields

#### 5.1.4.1 Field of Vision

#### 5.1.4.2 Field of Regard

#### 5.1.4.3 Instantaneous Field of View

##### 5.1.4.3.1 Foveal Vision

##### 5.1.4.3.2 Stereo Vision

##### 5.1.4.3.3 Fixation Vision

##### 5.1.4.3.4 Peripheral Vision

#### 5.1.4.4 Vision Zones

- 5.1.4.4.1 Primary
- 5.1.4.4.2 Secondary
- 5.1.4.5 Design Points
  - 5.1.4.5.1 Design Eye Point
  - 5.1.4.5.2 Eye Position Box
  - 5.1.4.5.3 Vision Plot
- 5.1.4.6 External Vision
- 5.1.4.7 Internal Vision
  - 5.1.4.7.1 Requirements
    - 5.1.4.7.1.1 Displays
    - 5.1.4.7.1.2 Control Settings
    - 5.1.4.7.1.3 Annunciators
      - 5.1.4.7.1.3.1 Warning
      - 5.1.4.7.1.3.2 Cautionary
      - 5.1.4.7.1.3.3 Advisory
  - 5.1.4.7.2 Obstructions
    - 5.1.4.7.2.1 Personal Equipment
    - 5.1.4.7.2.2 Body Parts
    - 5.1.4.7.2.3 Controls
    - 5.1.4.7.2.4 Protrusions or Panels
  - 5.1.4.8 Personal Services
- 5.1.5 Armor (JTCG)
  - 5.1.5.1 Personal Armor (DH2-8)
  - 5.1.5.2 Seat (DH2-8)
  - 5.1.5.3 Thermal Radiation Protection (DH2-8)
- 5.1.6 Sustenance and Relief (DH2-8)
  - 5.1.6.1 Food Storage (DH2-8)
  - 5.1.6.2 Galley Services (DH2-8)
  - 5.1.6.3 Relief Services (DH2-8)
  - 5.1.6.4 Lavatory Facilities (DH2-8)
- 5.1.10 Clothing and Accessories (DH2-8)
  - 5.1.10.1 Headgear (DH2-8)

- 5.1.10.2 Footgear (DH2-8)
- 5.1.10.3 Hand Gear (DH2-8)
- 5.1.10.4 Body Covering (DH2-8)
- 5.1.10.5 Specialized Clothing (DH2-8)

- 5.1.10.5.1 Type of Clothing

- 5.1.10.5.1.1 Shorts

- 5.1.10.5.1.2 Fatigues

- 5.1.10.5.1.2.1 Desert Camouflage Clothing

- 5.1.10.5.1.2.2 Desert Tan Clothing

- 5.1.10.5.1.2.3 Tropical Camouflage Clothing

- 5.1.10.5.1.2.4 Tropical Fatigues

- 5.1.10.5.1.2.5 Utility Fatigues

- 5.1.10.5.1.3 Protective Suit

- 5.1.10.5.1.3.1 Aviator's Suit

- 5.1.10.5.1.3.2 Firefighter's Suit

- 5.1.10.5.1.3.3 Fuel Handler's Suit

- 5.1.10.5.1.4 Mission Oriented Protection Procedure (MOPP)

- 5.1.10.5.1.4.1 MOPP I

- 5.1.10.5.1.4.2 MOPP II

- 5.1.10.5.1.4.3 MOPP III

- 5.1.10.5.1.4.4 MOPP IV

- 5.1.10.5.1.5 Footwear

- 5.1.10.5.1.6 Head Gear

- 5.1.10.5.1.6.1 Night Vision Goggles

- 5.1.10.5.1.6.2 Tinted Vision or Hoods

- 5.1.10.5.1.6.2.1 Chemical Defense Equipment Filtered Wavelengths

- 5.1.10.5.1.6.2.2 Laser Protection Equipment Filtered Wavelengths

- 5.1.10.5.1.6.2.3 Sun Visor Filtered Wavelengths

- 5.1.10.5.1.7 Hand Wear

- 5.1.10.5.2 Attributes of Clothing

- 5.1.10.5.2.1 Clothing Weight [kilograms]

- 5.1.10.5.2.2 Backpack Weight [kilograms]

- 5.1.10.5.2.3 Total Insulation Including Air Layer and Intrinsic Clothing
- 5.1.10.5.2.4 Permeability Index
- 5.1.10.6 Personal Accessories (DH2-8)
- 5.1.10.7 Night Vision Goggles
- 5.1.11 Fire Protection and Prevention (DH2-8)
  - 5.1.11.1 Fire Resistant Fuel Systems (DH2-8)
  - 5.1.11.2 Fire Resistant Crew Station (DH2-8)
  - 5.1.11.3 Fire Resistant Clothing (DH2-8)
- 5.2 Requirements
- 5.3 Logistics
- 5.4 Input or Output
- 5.5 Seat
  - 5.5.1 Seat Back Angle
  - 5.5.2 Vertical Seat Height
  - 5.5.3 Vertical Height of the Seat Reference Point Loci Above the Heel Rest Line
  - 5.5.4 Neutral Seat Referent Point
  - 5.5.5 Seat Reference Point Locus of Seat Adjustment
    - 5.5.5.1 Horizontal Adjustment
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  - 5.5.6 Heel Rest and Heel Rest Line
- 6 Social Factors
  - 6.1 Culture
    - 6.1.1 Population
      - 6.1.1.1 Group Identity
      - 6.1.1.2 Ethnic Mix
      - 6.1.1.3 Gender Mix
    - 6.1.2 Language
      - 6.1.2.1 Communication Within Organization
      - 6.1.2.2 Communication Outside Organization
    - 6.1.3 Psychology
      - 6.1.3.1 Cohesion
        - 6.1.3.1.1 Coordination

- 6.1.3.1.2 Involvement
- 6.1.3.1.3 Planning
- 6.1.3.1.4 Communication
- 6.1.3.1.5 Movement
- 6.1.3.1.6 Concealment
- 6.1.3.1.7 Shared Tasks
- 6.1.3.1.8 Perseverance
- 6.1.3.2 Leadership
- 6.1.3.3 Morale or Group Climate
- 6.1.3.4 Dominance
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- 6.1.3.6 Friction
- 6.1.3.7 Uncertainty
- 6.1.4 Religion
  - 6.1.4.1 Buddhist
  - 6.1.4.2 Catholic
  - 6.1.4.3 Hindu
  - 6.1.4.4 Jewish
  - 6.1.4.5 Moslem
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  - 6.1.4.7 Other
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  - 6.2.1 Government
    - 6.2.1.1 Democracy
    - 6.2.1.2 Dictatorship
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    - 6.2.1.4 Socialism
- 6.3 Economics
  - 6.3.1 Science and Technology
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- 6.4 Resources
  - 6.4.1 Manpower

- 6.4.1.1 Team Training
- 6.4.1.2 Operating Procedures
  - 6.4.1.2.1 Task Allocation
  - 6.4.1.2.2 Doctrine
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- 6.4.1.3 Personnel Rotation
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- 6.4.2 Data
- 6.4.3 Documentation
- 6.5 Group Characteristics
  - 6.5.1 Group Size
  - 6.5.2 Group Cohesiveness
    - 6.5.2.1 Encouraging Attitude
    - 6.5.2.2 Gate-keeping Attitude
    - 6.5.2.3 Harmonizing Attitude
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    - 6.5.2.5 Standard Setting for Attitude
    - 6.5.2.6 Testing Attitude
  - 6.5.3 Intra- and Inter-group Competition and Cooperation
  - 6.5.4 Group Communication Type
  - 6.5.5 Standard Communication Net
    - 6.5.5.1 Linear Net
    - 6.5.5.2 Circular Net
    - 6.5.5.3 Wheel Net
    - 6.5.5.4 Honeycomb Structure
    - 6.5.5.5 Hierarchical Net
    - 6.5.5.6 Multi-Connection Net

6.5.6 Homogeneity or Heterogeneity in Personality and Attitudes

6.5.7 Homogeneity or Heterogeneity in Ability

6.5.8 Power Distribution Within the Group

6.5.9 Group Training

6.5.10 Roles

    6.5.10.1 Task-Oriented Roles

        6.5.10.1.1 Seeking Information or Opinion

        6.5.10.1.2 Clarification

        6.5.10.1.3 Summarization

        6.5.10.1.4 Consensus Testing

        6.5.10.1.5 Elaboration

        6.5.10.1.6 Initiation

6.5.11 Type of Authority

    6.5.11.1 Physical Intimidation

    6.5.11.2 Legal Status

    6.5.11.3 Organizational Position

    6.5.11.4 Control of Information

    6.5.11.5 Knowledge of Subject

    6.5.11.6 Personality Characteristics

6.5.12 Decision Making

    6.5.12.1 Autocratic Attitude

    6.5.12.2 Blackball Attitude

    6.5.12.3 Majority Rule Attitude

    6.5.12.4 Consensus Attitude

6.6 Confinement

6.7 Isolation

6.8 Customs

## 5 References

The following publications are essential for effective use of this Guide.

- Berry, G.L. Task taxonomies and modeling for system performance prediction. Proceedings of the Human Factors Society 24th Annual Meeting. 425-429; 1980.
- Berson, B.T. and Crooks, W.H. Guide for obtaining and analyzing human performance data in a material development project. Aberdeen Proving Ground, MD: Army Human Engineering Laboratory; September 1976.
- Chignell, M.H. A taxonomy of user interface terminology. Special Interest Group for Computer-Human Interaction, 1990, 21(4), 27 – 34.
- Christman, N.J. A human factors taxonomy. Fort Leavenworth, KS: Army Command and General Staff College; 1977.
- Companion, M. A. and Corso, G. M. Task taxonomy: two ignored issues. Proceedings of the Human Factors Society 21st Annual Meeting. 358-361; 1977.
- Edmonds, E. Towards a taxonomy of user interface adaptation. Colloquium on Adaptive Man-Machine Interfaces; 1986.
- Edmondson, W.H. A taxonomy for human behaviour and human-computer interaction. Proceedings of the Fifth International Conference on Human-Computer Interaction. 1993, 2, 885 – 890.
- Fleishman, E.A. Toward a taxonomy of human performance. American Psychologist. 1127-1149; 1975.
- Gawron, V.J., Drury, C.G., Czaja, S.J., and Wilkins, D.M. A taxonomy of independent variables affecting human performance. Internaitonal Journal of Man-Machine Studies, 1989, 31, 643 – 672.
- Joint Chiefs of Staff Publication 1-02. Washington, DC; The Joint Staff.
- Joint Chiefs of Staff Publication 3-0. Doctrine for joint operations. Washington, DC: The Joint Staff; January 1990.
- Lees, M.A., Kimbal, K.F., and Hoffman, M.A. Aviator performance during day and night terrain flight (USAARL 77-3). Fort Rucker, AL: Army Aeromedical Research Laboratory; November 1976.
- Lysaght, R.J., Hill, S.G., Dick, A.O., Plamondon, B.D., Linton, P.M., Wierwille, W.W., Saklad, A.L., Bittner, A.C., and Wherry, R.J. Operator workload: comprehensive review and evaluation of operator workload methodologies (Technical Report 851). Alexandria, VA: Army Research Institute for the Behavioral and Social Sciences; June 1989.
- Military Handbook 46855 Notice 1, Human engineering Requirements for Military Systems, Equipment, and Facilities, January 1996
- Nieva, V. F., Fleishman, E. A., and Rieck, A. Team dimensions: their identity, their measurement and their relationships (Research Note 85-12). Alexandria, VA: Army Research Institute for the Behavioral and Social Sciences; January 1985.
- Samaras, G.M. Toward a mathematical formalism of performance, task difficulty, and activation. In J.R. Comstock Mental state estimation, NASA Conference Publication 2504, NASA Scientific and Technical Information Division; 1988.
- Sasou, K. and Reason, J. Team errors: definition and taxonomy. Reliability Engineering and System Safety, 1999, 65, 1 – 9.

Stanney, K.M., Hash, P., and Dryer, D. The task, interaction, and display (TID) taxonomy or human-virtual environment interaction. In Y. Anzai, K. Ogawa, and H. Mori (Editors) *Symbiosis of Human and Artifact*. New York, NY: Elsevier Science, 1995.

Taylor, J.R., Munson, K., and Taylor, M.J.H. *Jane's All the world's aircraft*. Surrey, United Kingdom: Jane's Information Group Limited; 1989.

TRADOC Pamphlet 11-9. Army programs blueprint of the battlefield. Fort Monroe, VA; 9 June 1989.

USAF. Disruption in combat; 1970.